Development Planning and Project Cycle Analysis for Sericulture in Central Java

Dissertation

Zur Erlangung des akademischen Grades

Doctor rerum agriculturarum

(Dr.rer.agr.)

Eingereicht an der

Landwirtschaftlich-Gärtnerischen Fakultät

der Humboldt-Universität zu Berlin

Von

Djeimy Kusnaman

Prof. Dr. Uwe Jens Nagel

Gutachter: 1. Prof. Dr. Hans E. Jahnke

2. Prof. Dr. Kurt J. Peters

eingereicht: 29 Juni 2004

Datum der Promotion: 29 Juli 2004

For my wife Inge,

sons: Tobias and Dion

Abbreviations

ADAA	Australian Development Assistance Agency
ADAB	Australian Development Assistance Bureau
AIDAB	Australian International Development Assistance Bureau
AusAID	Australian Agency for International Development
BCR	Benefit Cost Ratio
BDI	Bank Danamon Indonesia
BPS	Badan Pusat Statistik (Indonesian Office Statistic)
BRI	Bank Rakyat Indonesia
BSA	Banyumas Sutera Alam
CRS	Catholic Relief Service
CSO	Civil Society Organisation
DFID	Department For International Development
EP	Experimental Project
FAO	Food and Agriculture Organisation
GNI	Gross National Income
Ha	Hectare
IFI	International Financial Institution
INGO	International Non Government Organisation
IRR	Internal Rate of Return
ITC	International Trade centre
KKPA	Kredit kepada Koperasi Primer untuk Anggotanya
KKP	Kredit Ketahanan Pangan
KKPM	Kredit Kepada Pengusaha Kecil dan Mikro

KUPEDES	Kredit Usaha Pedesaan
KUTPA	Kredit Usaha Tani Persuteraan Alam
M&E	Monitoring and Evaluation
NGO	Non Government Organisation
NP	Nucleus Project
NPW	Net Present Worth
PP	Pilot Project
Rp.	Rupiah
SWOT	Strength Weakness Opportunity Threat
UKMK	Usaha Kecil Mikro Kredit
UNOPS	United Nations Office for Project Services
USA	United States America
USD	United States Dollar
YSBS	Yayasan Sosial Bina Sejahtera

Zusammenfassung

Die Serikultur, Produktion und Verarbeitung von Seide durch Ernährung der Seidenraupen mit Maulbeerblättern, hat ihren Ursprung in China. Von dort aus breitete sie sich jedoch in vielen anderen Ländern aus. Die Serikultur steht weder mit landwirtschaftlicher Nutzfläche noch mit Arbeitskraft in Konkurrenz zur Produktion von landwirtschaftlichen Gütern.
Sie wird daher als eine potentielle Einkommensquelle für Bauern in tropischen Regionen betrachtet. Die Produktionstechnologie ist nichtsdestotrotz entscheidend und hat hohe Anforderungen an organisatorische und institutionelle Rahmenbedingungen.

Diese Arbeit konzentriert sich auf einen Fall Indonesiens[1]. Ein Entwicklungsland, das aus einem ca. 1.919.440 qkm großen Inselarchipel besteht, mit über 17.000 Inseln (davon sind 6.000 bewohnt) und einer geschätzten Bevölkerung von 235 Millionen (2003).

Die Hauptinsel Indonesiens Java, weist eine 100 Millionen Menschen große Bevölkerung auf einer ca. 132.190 qkm großen Fläche auf. Dies korreliert mit einer Bevölkerungsdichte von etwa 1000 Personen pro qkm, eine der weltweit höchsten Zahlen der Bevölkerungsdichte. Achtzig Prozent der javanesichen Bevölkerung leben in ruralen Regionen und über neunzig Prozent sind in der Landwirtschaft tätig.

Die erste organisatorische Struktur des serikulturellen Projekts wurde in Zentral-Java (im Banyumas Sutera Alam, BSA) im Jahr 1997 gegründet, unter der in fünf umliegenden Distrikten über 200 ha mit Maulbeersträucher bepflanzt wurden. Das erste dreitägige Intensiv-Training wurde von 700 Bauern besucht.

Diese Arbeit analysiert die Prinzipien des Projektzyklus' des BSA-Projekts in Zentral-Java, um durch Verknüpfung von induktiver und deduktiver wissenschaftlicher Vorgehensweise zu ermitteln, wie ein Projekt praktisch hinsichtlich grundlegender Methoden und ihrer Generalisierbarkeit analysiert werden kann.

Ziele der Arbeit sind zunächst die Darlegung der Implementierung der Entwicklungsziele in einem konkreten Fall, des Weiteren die Untersuchung hinsichtlich des Prinzips des Entwicklungsprojektes und des Projektzyklus', sowie der unterschiedlichen praktischen, methodischen Instrumente in den verschiedenen Phasen des konkreten Falles, die Darstellung

---

[1] http://www.bps.go.id (Statistiken zu Indonesien)

der theoretischen und praktischen Herausforderungen in unterschiedlichen Phasen des Projekts auf wissenschaftlichem Niveau. Weiteres Ziel ist die Veranschaulichung der Ergebnisse einer Investitionsanalyse, um auf der Basis aller durchgeführten Analysen die Rolle der Serikultur als Annäherung zum Ziel der potentiellen Cash-Gewinnung und Armutsreduzierung in Zentral-Java zu beurteilen.

Probleme wurden auf der Betriebs- und Projektebene identifiziert. Diese konnten teilweise korrigiert werden. Eine tiefergehende Untersuchung und ein Monitoring-Programm wurden für die Bereiche der Produktionsleistung und der institutionellen Organisation des Projekts durchgeführt. Dafür wurden Daten von 150 partizipierenden Bauern gesammelt, die 40 Ernten Kokons in einem Zeitraum von 1999 bis 2002 erbrachten. Es wurde eine Investitionsanalyse und Sensitivitätsanalyse nach drei unterschiedlich Betriebsgrößen erstellt.

Um einen Strategieplan zu entwickeln, wurde eine Varianzanalyse anhand einer Evaluierung der Maulbeersorten *Morus alba L.* (Ma), *Morus cathayana* (Mc) and *Morus multicaulis* (Mm) und der optimalen Frequenz der Fütterung der Seidenraupen unternommen.

Die institutionelle Organisationsleistung wurde anhand einer SWOT-Analyse (Strengths; Weaknesses; Opportunities; Threats) ausgewertet.

Die sich daraus ergebenden Schlussfolgerungen wurden im Hinblick auf die zukunftsfähigen Unternehmungen im Projekt BSA dargestellt. Es wurden dabei drei Kategorien an Herausforderungen erstellt, die sich auf folgende Aspekte konzentrieren: Erstens die Aufzucht der Seidenraupen; zweitens die Raupenhaltung bei den Bauern und drittens das Marketing der Seidenprodukte. Diese sind hinsichtlich der Zukunft des Projekts und der Nachhaltigkeit des Projektziels verstärkt zu beachten und zu verbessern.

Schlagwörter:

Investitionsanalyse , Projektzyklus, Sericulture, SWOT-Analyse, Zentral Java.

SUMMARY

Sericulture, the production and processing of natural silk from silkworms feeding on mulberry leaves has its origin in China, but has spread to many other countries. Neither land nor labour in sericulture are in direct competition with the cultivation of staple crops. Sericulture is therefore seen as a potential source of additional income for small farmers in the tropics. The production technology, however, is sensitive and the demands on the organisational and institutional environment are considerable.

This study focuses on Indonesia[2], a developing country 1,919,440 sqkm, in area consisting of an archipelago of more than 17,000 islands (6,000 inhabited) with a population estimated in 2003 to be 235 million.

Java, as the central island, has a population of 100 million on area of 132,186 sq km. This corresponds with a population density of approximately 1000 persons per sq km, among the highest of any region in the developing world. Eighty percent of the Javanese population live in the rural areas and more than ninety percent are engaged in agriculture.

The first organisational structure was created in Central Java (Banyumas Sutera Alam /BSA) in 1997, under whose umbrella over 200 hectares in five surrounding Mayoralties were planted to mulberry. The first 3-day live-in training program was attended by 700 farmers.

This study analyses the principles of the project cycle of sericulture project in Central Java to show in a combination of inductive and deductive scientific procedure how a very practical project can be analysed for its basic methods and generalisability.

The objectives of the study are to follow through the implementation of development goals for a concrete example; to examine the concept of development project and the concept of the project cycle, to examine the practicality different methodical instruments in different phases for concrete project; to show the theoretical and methodical challenges in different phases of project on a scientific level; to demonstrate the consequences of an investment analysis, to discuss on the basis of all the analyses carried out the potential role of sericulture as an approach to cash generation and poverty alleviation in Central Java.

---

[2] Source: http://www.bps.go.id (Statistics of Indonesia)

Problems were identified at the farm level and at the project level. These could partly be rectified. A more in-depth research and monitoring program was instituted for the project concerning the performance in production and institutional organisation.

Data were collected from 150 participating farmers, which cocoons were harvested 40 during 1999 – 2002. Investment analysis and sensitivity analysis for different farm size categories were carried out.

In order to develop strategic plan, a variance analysis was undertaken to evaluate the mulberry varieties *Morus. alba L* (Ma), *Morus cathayana* (Mc) and *Morus multicaulis* (Mm) and the best frequency of feeding on silk production. The institutional performance was subjected to a Strength Weakness Opportunity Threat (SWOT)-Analysis.

Emerging conclusions are presented with a view to their future application to the project at Banyumas Sutera Alam. Three categories of main problems need to be addressed: breeding of worms, cultivation silkworm at the farmers and marketing of silk products.

Keywords:

Central Java, Investment analysis, Project cycle, Sericulture, SWOT-Analysis.

Table of Contents

List of Appendix

List of Figures

List of Photos

List of Tables

ACKNOWLEDGEMENTS

I wish to extend my profound respect and gratitude to a number of people and organisations whose generous contribution I would like to acknowledge:

1. My first supervisor, Prof. Dr. H. E. Jahnke, Department of Development Planning and Project Management, Institute of Agricultural Economics and Social Sciences, Faculty of Agriculture and Horticulture at Humboldt University of Berlin, Germany for his constant patience and guidance, providing valuable information and useful suggestions and encouragement.
2. My second supervisor, Prof. Dr. K.J. Peters, Department of Animal Breeding in the Tropics and Subtropics, Institute of Animal Sciences, Faculty of Agriculture and Horticulture at Humboldt University of Berlin, Germany for providing valuable information about this topic.
3. The chairmanship, Prof. Dr. O. Kaufmann, Department of Animal Husbandry and Technology, Institute of Animal Science. The commission of staff: PD.Dr. D-Gillwald, Department of Development Planning and Project Management, Institute of Agricultural Economics and Social Sciences and PD. Dr. H. Hoffmann, Department of ecology of utilisation of resources, Institute of Crops science, Faculty of Agriculture and Horticulture at Humboldt University of Berlin, Germany for their assistance and helpful advice.
4. My lecturer, Dr. J. Dingle, Senior Lecturer in School of Animal Studies and Dr. Errol Hassan, Senior Lecturer in Integrated Crop Management School of Land and Food Plant Protection, Queensland University, Australia for their assistance, critiques, advice and their time during my stay at University of Queensland, Australia.

   Mr. Allan Lisle, Statistical Adviser in School of Agronomy and Horticulture, Queensland University, Australia for his assistance in statistic analysis.
5. Prof. Dr. Ramesh C. Agrawal and Prof. Dr. Christian Bonte-Friedheim, Humboldt University of Berlin, Germany, for their time to assisted me.

   Mrs. H. Meaini for her assistance and encouragement and other employees during my study at the Humboldt University of Berlin, Germany

6. The director of University Wijayakusuma, Purwokerto, Central Java, Indonesia, Prof. Dr. H. Iswanto SH; the director of University General Soedirman, Purwokerto, Central Java, Indonesia, Prof. Rubianto W, and Prof. Dr. Ir. Sunarto MS, Department of Plant Breeding, Faculty of Agriculture University General Soedirman, Purwokerto, central Java, Indonesia for his helpful advice and assistance.
7. The KAAD president Prof. Dr. J. Reiter; KAAD Asia Region Consultant Dr. H. Geiger and KAAD committee in Indonesia Dr.-Ing. H. Kartarahardja for providing financial support without which this study would not have been conducted.
8. Fr. Pat Mac Anally OMI, my spiritual support, for his helpful during my research at Laho-Baucau, East Timor and my stay at Brisbane, Queensland, Australia.
9. Director of Yayasan Sosial Bina Sejahtera (YSBS), J. Karso Suryo Supono and staff, the students of Queensland University, Australia, especially Masjuni and Alice, Mr. And Mrs. Darwin and Willy. Also the students of University General Soedirman, Purwokerto, Central Java, Indonesia and students of the Humboldt University of Berlin, Germany
10. Dipl. Ing. agr. A. Poetter for her critiques and helpful, during my research at Humboldt University of Berlin, Germany
11. My beloved wife, Margaretha Inge Juniati and my sons, Tobias Kusnaman and Mathias Lourdion Kusnaman for their encouragements and inspiration during the period of my study.

Nevertheless, also others not mentioned here.

Declaration of Originality

This Dissertation reports the original work of the author,
except as otherwise stated. It has not been
submitted previously for a degree at any University

Berlin, 25 June 2004

Djeimy Kusnaman

1 Introduction

1.1 The Problem

Making a livelihood is part of man's existence. Poverty in a most general sense means that one does not make out as well as others or as well as one would have liked to. There may be many underlying reasons for poverty. Poverty probably has always existed as a real phenomenon. But it was the international agreements drawn up at Bretton Woods towards the end of World War II that spelt out for the first time that poverty was a world-wide concern (World Bank Reports, various years). The term "underdeveloped" world was introduced, later replaced by the more optimistic – but not necessarily more realistic – term "developing countries".

Developing countries, self-defined and declared as such in the United Nations, are poor countries. Poverty may be measured by per-caput-income, purchasing power parity, human development indicators or by other means, and is in the first instance a relative term (e.g. Hemmer, 2002). They all mean that people are less well off than one would hope for in comparison.

Poverty exists, and it does not matter very much which historical or ideological reasons we attach to it. The more useful way to look at it is that there are many examples where relative poverty, even absolute poverty threatening people's lives (starvation) can be overcome. Examples from the so called industrialised countries are the Alpine regions, the poverty-stricken regions of southern Germany, the Mezzogiorno of Italy, and many regions of Ireland.

Admittedly these improvements in Europe were associated with the general process of industrialisation while the growth rate of the population was relatively low. However we also have India and China at hand for examples of at least a reduction in relative and absolute poverty, and there are other examples in Asia and in other developing regions. The historical evidence suggests that something can be done against poverty, that poverty alleviation is a real possibility.

This study focuses on Indonesia[3], a developing country of 1,919,440 sqkm consisting of an archipelago of more than 17,000 islands (6,000 inhabited) of which the five large

[3] Source: http://www.bps.go.id (Statistics of Indonesia)

land masses make up for about ninety percent of the total area: Sumatra (473,481 sqkm) , Java (132,186 sqkm), Kalimantan (548,005 sqkm), Celebes (189,216 sqkm) und West-New guinea/Papua (421,981 sqkm). The Current population projection in Indonesia (2003) is about 235 million.

Java as the central island has a population of 100 million on a surface of 132,186 sq km. This corresponds with a population density of ± 1000 persons per sq km, among the highest of any regions in the developing world. Eighty percent of the Javanese population live in rural areas and more than ninety percent of the rural population are engaged in agriculture.

Geertz (1961) coined the term “involution” for Java. It is the epitomy of hopelessness with respect to autonomous flight out of poverty. It means that there is no “no light at the end of the tunnel”. It means that population continues to grow, in Java at rates at rates above 2% p.a., while there is hardly any means for an additional person to add to the overall income. With every additional person the average income falls, poverty increases.

Geertz´s dire vision has been counteracted by the phenomenon of the Green Revolution. Improved varieties together with complementary inputs have made it possible for the wet rice system to keep pace with population growth. But poverty has not really been alleviated and cash income has rather decreased. The “trasmigrasi” programs, i.e. the public efforts to make people move to the other much less densely populated islands of the archipel have had very limited success (von der Ruhren, 1994). In search for betterment and for cash income there has resulted the uncontrolled movements into the cities, or rather the slums thereof.

It is obvious, under these circumstances, that any rural activity that generates additional income, especially cash income, at low opportunity costs would be most welcome. It would have to be examined and tested thoroughly for its wider applicability, because it is likely to be a new venture. Under conditions of very low incomes one would not wish to promote an idea and then leave it to the poverty-stricken farmer to test it out on his own risk. One such new venture is sericulture.

Sericulture is the term used for the totality of activities necessary to produce silk from eggs of the silk moth worms over various stages by feeding them mulberry leaves until they produce the cocoon from which the silk filament is gained; the term also includes the processing stages from the filament to the yarn and finally to the silk cloth.

1.2 Objectives of the study and theoretical setting

Sericulture may be one of the possibilities that may be able to refute the depressive involution thesis. In other words, there may be new and additional opportunities for income generation in rural areas for developing regions, in for example South Asia, in particular Java/Indonesia. The focus is on cash income through the use of resources with low opportunity costs, i.e. labor and land not needed for other productive purposes.

In very general terms one could state that there exists the hypothesis that rural incomes, especially cash incomes, can be raised through the introduction of sericulture. However, this formulation is too broad, too general. Such a hypothesis would not deserve the term because it could not be subjected to empirical testing, not even to theoretical reasoning or plausibility considerations. One would not come near the reasons for saying yes or no to sericulture, because the process is too complex.

The introduction of sericulture requires a project approach. It is not a matter of having the idea alone, or that of simply making a resource or a piece of knowledge available. It is a matter of going through all the phases of a project in theory and - if possible - in practical testing. The general hypothesis has to be broken down into many smaller and better manageable ones. The project becomes an operational unit that has to undergo phases and has to perform according to stated objectives within a time frame.

Thus a project is not a plan ("projectere"), a dispassionate look into the future. Rather, and in line with all the presently used definitions in development cooperation[4], a project is an organizational unit within which resources are spent in order to reach specified objectives.

A project could be equated to a private enterprise and a private investment were it not for its explicit social implications and its international finance. A privately financed

---

[4] E.g. The World Bank (as e.g. in Gittinger, 1994) the European Union, the German development cooperation (as e.g. early on formulated for KfW by Ruthenberg) etc

investment may take its path according to personal experience, friendships etc. and unexplained criteria.

A publicly financed project has to be explained and justified in its various stages and within its phases from programming to planning and evaluation. For this purpose the concept of a project cycle is used by most international institutions.

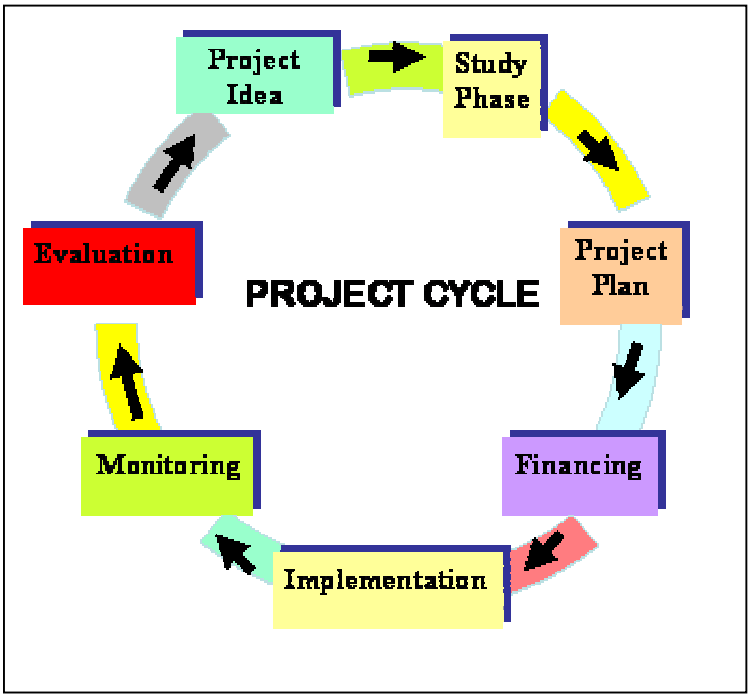


Figure 1 Schematic Representation of the Project Cycle

A project idea needs formulation, initial analyses, feasibility studies, a definitive project plan, finance proposals, implementation strategies, concepts for monitoring and evaluation, and – in the end – the integration into the strategies and policies for the formulation of future projects.

The objectives of the present study are

- to follow through the implementation of development goals for a concrete example;
- to examine the concept of a development project and the concept of the project cycle in terms of the inherent theoretical and methodical implications, step by step;
- to examine the practicality of different methodical instruments in different phases for concrete project;
- to show the theoretical and methodical challenges in the different phases of a project on a scientific level;

- to demonstrate the consequences of an investment analysis for the example of sericulture in Java/Indonesia in using calculations and interpretations comprehensible to all parties concerned, and
- to discuss – on the basis of all the analyses carried out – the potential role of sericulture as an approach to cash generation and poverty alleviation in Central Java and other comparable regions.

1.3 Approach and organisation of the study

The case at hand is sericulture, and because of its biotechnical particularities it requires some special treatment. Chapter 2 therefore deals with sericulture as a biotechnical phenomenon, with its origin and spread to the present time and with sericulture in South-eastern Asia, giving particular attention to Indonesia.

Chapters 3 to 9 reflect the seven phases of the project cycle. While in no way being patented or logically compelling in an absolute way, it provides a useful framework, not only for planning and implementing a project, but also for theoretical analysis. The present work takes up the principle of a project cycle to show in a combination of inductive and deductive scientific procedure how a project can – step by step - be analysed for underlying theory, for its basic methods, for practical execution. The project cycle is thus taken as an intellectual challenge that can and should be put to scientific scrutiny in order to arrive at development approaches that are scientifically sound, practicable and generalizable.

Chapter 3: The project idea

Origins of a project can be very different and do not really lend themselves to scientific scrutiny. Quite often the ideas have already been put into the framework of sectoral or regional development plans or fixed within international agreements of cooperation. In many cases, but by no means in all, there exists a generally agreed country strategy paper laying down policies and principles of economic development. In such a case the main task is to examine the compatibility of an idea with the general strategy and to determine whether the idea is to be further pursued.

As for the present case of a sericulture project, the general idea is to generate income, in particular cash income, for rural rural households, to create working places and to stabilise

agricultural production. This idea needs to be refined in order so that a first identification of a project can be achieved.

Chapter 4: The study phase

The study phase can encompass very different studies all concerned with the feasibility of a project which has initially been identified. Often, pre-feasibility and feasibility studies are distinguished depending on the degree of their concreteness. These studies do not necessarily need to come up with deterministic results. In fact the approach emphasized in this paper is the execution of sensitivity analyses. The result is not that so many kg's of mulberry leaves need to be fed to the worms so many times a day. Rather the study gives an answer to the question of what would happen if the quantity fed varied by so much. Similarly a market study would not end by saying that the likely price is so much per kg of cocoon. Rather it would examine the likely range or variation of prices and their effects on the project.

Chapter 5: The project plan

All significant aspects of the idea have been studied, taking account of the orientations of the Country Strategy Paper, and the views of the main stakeholders. Detailed implementation schedules, including a Log Frame with indicators of expected results and impact, and implementation and resource schedules, are part of the project plan. Hard-core economic calculations of expected benefits to farmers, income effects and return to capital are included. "Softer" considerations like effects on the environment, on distribution and on gender are also included.

A good project plan would also contain a section risks and uncertainties involved.

The project plan essentially serves two purposes: (1) It is the basis for presentation to potential financial institutions and/or donors; it may therefore already include tentative finance proposals. (2) It serves as the basic reference document for project management and all stakeholders throughout project implementation up to the evaluation phase. It is the fundamental reference document for the monitoring activities.

´

Chapter 6: Finance proposals and their realisation

The finance proposals contained in the project plan normally only serve as a framework for discussion with potential donors. Having identified suitable and interested finance organizations it will then be necessary to transform the finance proposals to the requirements

of the respective finance organization. This requires the drawing up of separate documents including details of money transfers, procurement procedures, control mechanisms, repayment conditions if any, reporting requirements and the like.

For the case at hand the finance proposal had an external component (AusAID, Misereor, DFID British, local NGOs), and an internal one between the project management and the participating farmers.

Chapter 7: Implementation

Implementation means putting to use the agreed and available resources to achieve the project purpose. It normally involves at least three elements: (1) The establishment of a managerial structure including the physical infrastructure for project management and for the nucleus activities. (2) The mobilization of the target group(s) down to the individual households with which project management intends to cooperate. (3) The putting in place of the systems for input delivery, for extension, for collection of the outputs and for processing.

The transformation of the project plan into reality poses the actual management challenge. The project plan is like a theoretical chess game that you construct “in the dry” for yourself and against yourself”. The next step towards reality is to have a real game where you do not yourself design the response to your moves. The ultimate step towards reality is that you do not even have your own moves under control because you cannot implement directly but you have to work through persons (principal-agent syndrome).

Chapter 8: Monitoring and evaluation

Monitoring and evaluation have become a technical twin term (M&E).[5]

Monitoring is defined as the continuous assessment of project implementation in relation to agreed schedules and in relation to the plans for inputs into and outputs from the project. Monitoring provides managers and other stakeholders with a continuous feedback on implementation. It identifies actual or potential successes and problems as early as possible to facilitate timely adjustments of project operations.

Evaluation on the other hand refers to a one-time assessment or periodic assessments – in retrospective - of a project's relevance, performance, efficiency, and impact (both expected and unexpected) in relation to stated objectives: Project managers undertake interim

evaluations during implementation as a first review of progress, a prognosis of a project's likely effects, and as a way to identify necessary adjustments in project design. The use of mid-term reviews of ongoing projects has spread widely in the last two decades. Terminal evaluations, conducted at the end of a project, are required for project completion reports. They include an assessment of a project's effects and their potential sustainability.

Used carefully at all stages of the project cycle, monitoring and evaluation can help to strengthen project design and implementation and stimulate partnership with project stakeholders. It can influence sector assistance strategy. Relevant analysis from project and policy evaluation can highlight the outcomes of previous interventions, and the strengths and weaknesses of their implementation.

A major aim is the improvement of project design. The use of project design tools such as the log frame (logical framework) results in a systematic selection of indicators for monitoring project performance. The process of selecting indicators for monitoring is a

---

[5]Source:http://lnweb18.worldbank.org/oed/oeddoclib.nsf/0/770fd50eae49c6cd852567f5005d80c7?
Open Document

test of the soundness of project objectives and in this way can lead to improvements in project design. Another important aspect is the incorporation of stakeholder views. Awareness is growing that participation by project beneficiaries in design and implementation brings greater "ownership" of project objectives and encourages the sustainability of project benefits. Ownership brings accountability. Objectives should be set and indicators selected in consultation with stakeholders, so that objectives and targets are jointly "owned". The emergence of recorded benefits early on helps to reinforce ownership, and early warning of emerging problems allows action to be taken before costs rise. The need for mid-course corrections is shown. A reliable flow of information during implementation enables managers to keep track of progress and adjust operations to take account of the immediate experience.

Chapter 9: Evaluation

Evaluation is an “assessment, as systematic and objective as possible, of an ongoing or completed project, programme or policy, of its design, implementation and results. The aim is to determine the relevance and fulfilment of objectives, developmental efficiency, effectiveness, impact and sustainability. An evaluation should provide information that is credible and useful, enabling the incorporation of lessons learned into the decision-making process of both recipients and donors”.

An evaluation can be done during implementation (*mid-term*), at its end (*final evaluation*) or after the event (*ex-post evaluation*), either to help steer the project or to draw lessons for future projects and programming. An evaluation should led to a decision to continue, to rectify or stop a project and the conclusions and recommendations should also be taken into account when planning and implementing other similar projects in the future.

For the case at hand the evaluation follows the principles of a conventional economic analysis (thus including the calculation of economic benefit-cost ratios, internal rates of return and net benefit increases) but also includes a SWOT-Analysis. Furthermore, analyses of technical production, a regression analysis of mulberry plantation and of silkworm breeding were carried out. An evaluation, while based on the retrospective has its major value in the prospective: Modifications to be made; halting the project to stop further losses, mistakes to be avoided in future projects

Chapter 10: Discussion and conclusions

The discussion and the conclusions relate to three aspects: (1) The sericulture project as so far implemented in Central Java; (2) the project cycle approach in its theoretical and methodological implications, and (3) the potential of sericulture projects for the future.

2 Background and literature review

2.1 Sericulture as a biotechnical phenomenon

Biology of the silkworm

Silkworms are stenophagous insects that are fed solely mulberry leaves. They through four different stages, viz., egg, larva, pupa and moth for the complete the life cycle.

Adult moths have creamy white wings with brownish patterns across the front wings. The body is very hairy and the wingspan is about 50 mm. Adult females are larger and less active than males. Male moths actively crawl around looking for females. They will copulate for several hours (CISEO, 1997).

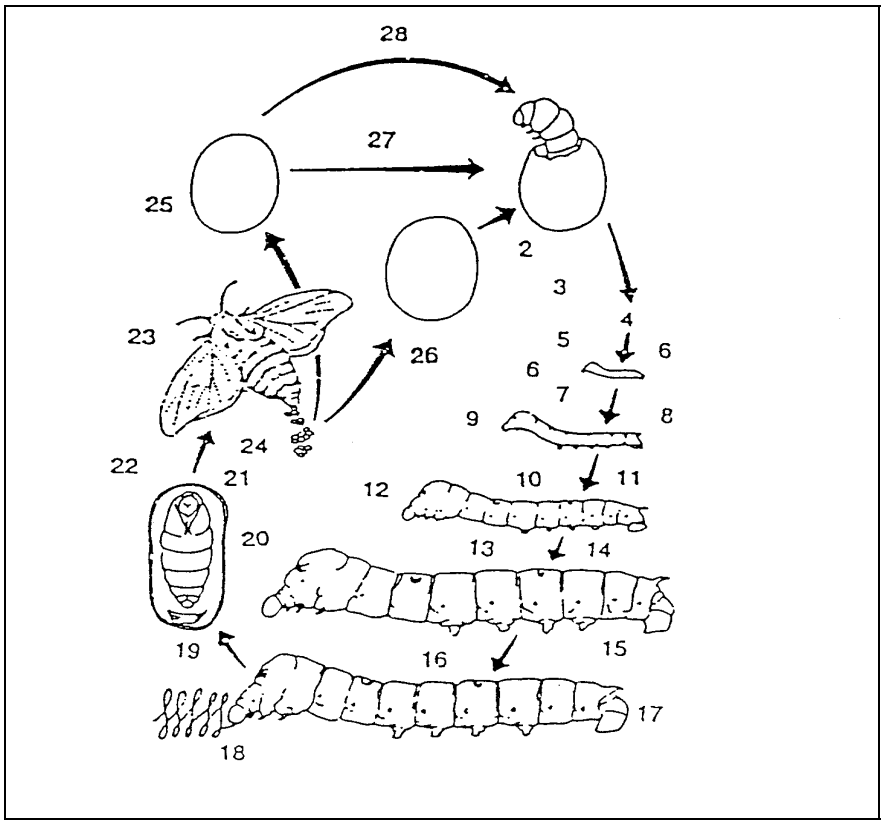


Figure 2 The life cycle of silkworm.

Insertions: 1. Hatching, 2. 9 –12 days, 3. Brushing, 4. First instar, 5. Three to four days 6. First moulting, 7. 3-7 days, 8. Second moulting, 9, Third instar, 10. 3-4 days, 11. Third moulting, 12. Fourth instar, 13. 5-6 days, 14. Fourth moulting, 15. Fifth instar, 16. 6-8 days, 17. Ripe silkworm, 18. Spinning, 19. Pupation 4-5 days, 20. Pupa inside cocoon, 21. 10-15 days, 22. Emergence of moth, 23. Moth, 24. Eggs, 25. Diapause egg, 26. Non diapause egg, 27. Artificial hatching 11-14 days, 28. interring(no scale)
Source: Veda, K., et al., (1997)

After hatching from eggs, the silkworm larvae grow by feeding on mulberry leaves, except during moulting, during immature stage they moult four times then become matured larvae in about 25 days. During this period, the silk glands utilize proteins, amino acids, carbohydrates, etc., present in mulberry leaves as raw material and synthesise fluid silk which is secreted into the gland sacs. The fluid silk, thus secreted, comes out as a silk filament through the spinneret (Veda, K., et al., 1997).

The silk filament is a continuous thread of great strength measuring from 500 - 1500 meters in length. Single filaments are too thin for utilization. For production purposes, several filaments are combined with a slight twist into one strand. This process is known as “silk reeling or filature” (FAO, 1999).

Sericulture

Silk production encompasses planting mulberry trees up to production of eggs from moths, from supervision of single instar of silkworms until the cocooning, the harvesting of cocoons and processing to thread, yarn and fabrics. The complexity of the production activities needs manual labour force.

Sericulture activities are broadly classified into two: the agro-based sector and the industrial sector. The agro-based part involves two distinct phases of activities i.e. mulberry cultivation and silkworm rearing. Silkworm rearing is again differentiated into two: young age rearing from 1st instar to 2nd instar. The 3rd instar although an intermediate stage, is considered as young age. Rearing of 4th and 5th instars comes under late age rearing.

Photo1. Early silkworms

Photo 2. Mature silkworms larvae

Mulberry trees (Morus spp.)

In flora categories, mulberry belongs to the family Moraceae, genus Morus. The genus Morus has many species and subspecies. Again, under the species and subspecies, there are several varieties. The natural distribution of the genus Morus covers western Africa, Middle Eastern Asia and Central and South America. It is not a natural plant of Europe (Veda, K., et al., 1997).

The mulberry tree is a quickly growing tree providing a lot of leaves. It grows in subtropics and temperate latitudes in evergreen tropics and reaches a height of up to 20 to 25 metres.

It has a wide spread expansion (see figure 3)

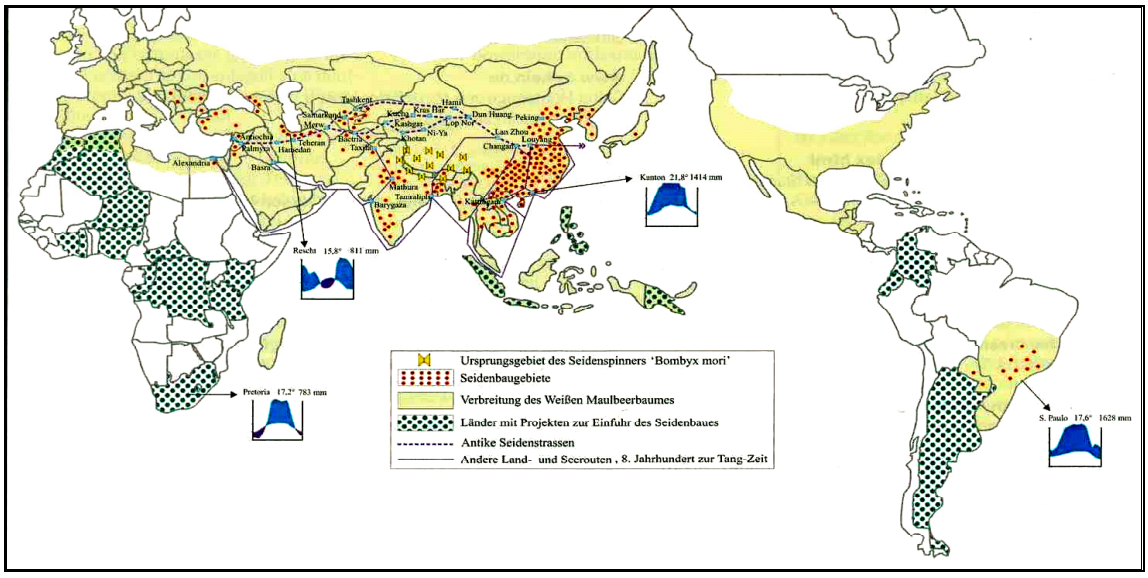


Figure 3 Origin and spread of sericulture and Silk Road in 8th century

Source: Sharifi (1994)

Mulberry leaves are the only foods tuft accepted by the silkworm. Therefore every single silkworm breeding activity that is planned has to make sure that a sufficient amount of mulberry trees is grown for food supply.

On the basis of usage of mulberry, the mulberry field is classified into the type utilized for rearing young silkworms and the type utilized for rearing older ones. Regarding the mulberry field for rearing young silkworms, some areas are used exclusively for spring rearing and other areas are used exclusively for summer and autumn rearing (Veda, K., et al., 1997).

The type of mulberry field is selected on the basis of weather conditions of each region, soil conditions and coordination with silkworm rearing.

Photo 3. Mulberry plants

Egg production

The production of silkworm eggs correlates closely with breeding success and is mainly carried out in specific institutions. Silkworm eggs are broadly classified into parent eggs and hybrid eggs. In the case of the parent ones, there are two types, parent eggs which are used for preparing hybrid eggs, and grandparents eggs which are used to produced the parent eggs. The hybrid eggs are known as the commercial silkworm eggs from which the larvae are used for producing reeling cocoons from which no adult moths are allowed to emerge. All other eggs are used for producing breeding adult moths.

Silkworms have a wide range of races, some of which are classified in the following manner:

- According to their native region: Chinese race, Japanese race, European race, tropical race, etc.
- According to voltinism: univoltine, bivoltine and polyvoltine or multivoltine.
- According to moulting feature: trimoulter, tetramoulter, pentamoulter and rarely hexamoulter and bimoulter.

Silkworms are also classified according to colour, shape and size of eggs, larvae, pupa, moth, cocoon, as well as on the basis of larval pattern, strength, course of larval period, quantity of fibre, reelability, etc. According to their utilisation, silkworms are classified, besides the race

used for producing silk fibres there are some which are used for high quality fabrics (fine and lousiness-free) and for special textures (Veda, K., et al., 1997).

Worm breeding

Immediately after hatching, the worms start eating mulberry leaves. A hatched silkworm larvae weighs approximately 0.45 mg and exclusively eats leaves of mulberry tree (Morus spp). The larvae develop in four stages for about 25 days, and between each of the four stages they undergo moulting and at the end they spin cocoons.

Photo 4. Cocoons processing

A silkworm is ready to spin a cocoon when it weigh's about 5 g. First, a thread capsule is spun and after that the worm spins itself inside its cocoon. A cocoon weights about 1.25 - 2.50 g and has a filament of 500 - 3000 m long, dependent on silkworm breed and cultivation season. The cocoon spinning is completed in two days. In the next two-three days, the larvae inside the cocoons moult and become pupa. The pupa takes 10 days to transform into a moth which is white-grey coloured; The female moth produces 300 - 500 eggs.

The quantity of mulberry leaf supplied during the rearing of advanced stage larvae amounts to 90% of the total supply of mulberry (800 kg – 1000 kg) during the entire larval period.

During the fourth and fifth instar the quantity of mulberry feeding is very large and consequently the labour requirement also becomes high. Therefore silkworm rearing from the fourth instar until fresh cocoon spun is commonly accomplished by silk farmers.

Processing

The silk yarn production begins with selecting for their quality. The cocoons will be sorted into normal and abnormal cocoons. The fresh cocoons normal are reelable to produce raw silk but the abnormal cocoons are unreelable. The abnormal cocoons are double cocoons, perforated cocoons, internally and externally soiled cocoons, thin-end cocoons, thin-middle cocoons, malformed cocoons, etc.

Photo 5. Silk yarn processing

After the first selection of cocoons, they have to be dried. The first goal of cocoon drying is the protection of cocoon quality, to preserve conditions for reeling cocoons and prevent damage that might be caused by long periods of storage. Drying kills the pupa and evaporates moisture that would otherwise ruin cocoons.

Dried cocoon storage conditions are designed to keep the raw material for long periods without any damage from moulds and pests. Cocoon storage should preferably be built with double walls. Cloth or polyethylene bags are recommended as containers for dried cocoon storage.

The technological process for silk reeling is shown in figure 4.

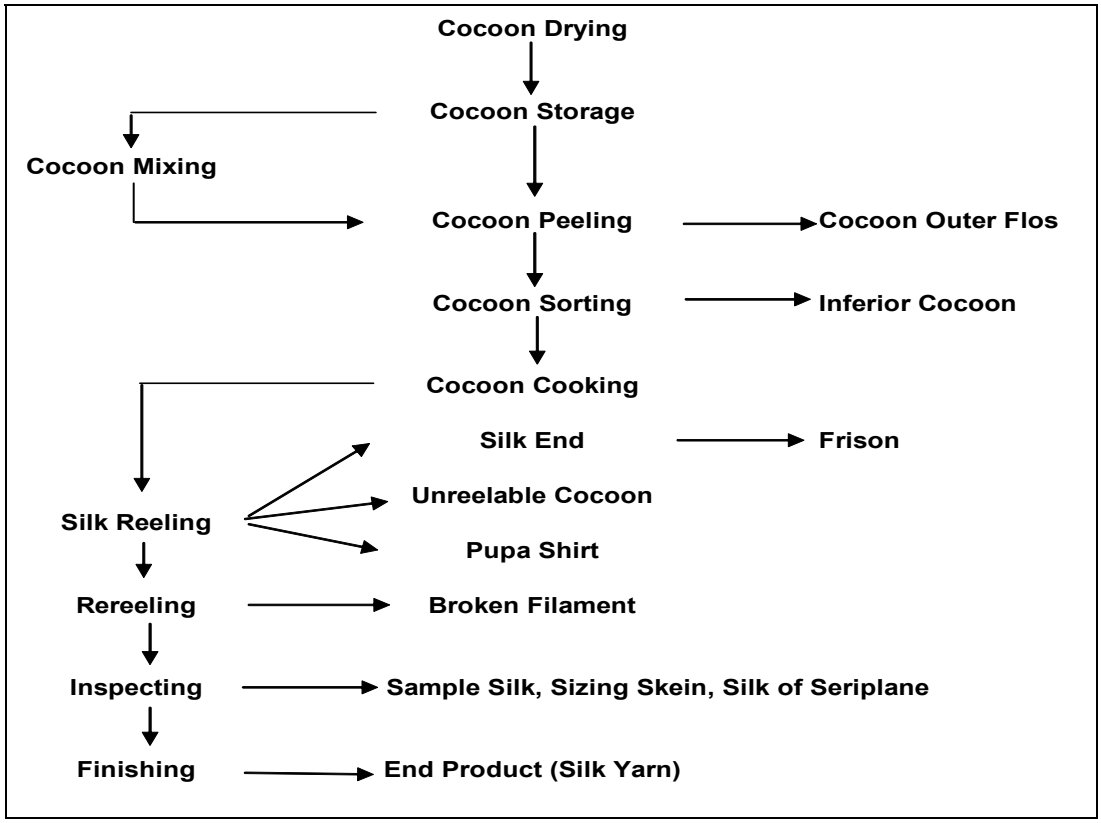


Figure 4 Technological process for silk reeling.

Source: Complete set of Equipment for Silk Reeling . Hangzhou Textile Machinery General Factory. The People's Republic of China (1998), modified

In most modern factories which aim at producing high-grade raw silk, the cocoons are graded on visual inspection or by mechanical tests are actually mixed as in the required proportions. This is called cocoon mixing or blending and is done to ensure speed and uniformity of reeling as well as to obtain the desired effect in raw silk.

The reelable cocoons have then to undergo the reeling processing, after which they are either processed further to raw silk or to thrown silk. The unreelable silk is processed further to spun silk.

2.2 Origin and spread

History

The origin of silkworms is not definitely known. In general the Chinese Himalayan region is understood to be the origin. There are also opinions naming the north-eastern Indian Himalaya as an origin of silkworm. There is evidence using C14-Isotope-Test that silk production was occurring around 2850-2750 B. C. in China.

Development of sericulture in China

In China, sericulture seems to have had its beginning in Huango and Yangtze (Chang Jiang provinces), (FAO, 1980). Diverse literature sources tell of the development of silk production (silkworm breeding, planting and usage of mulberry trees, spinning of yarn and weaving of fabrics) reaching back to emperor Huang-ti and his wife Hsi-ling-shi around 2600 B. C. - eventually even further back to 5000 B.C. (Messerli, 1986). Others tell of exploration in the 1122 - 255 B. C. (Mell, 1955).

Sericulture extension was supported at the highest governmental level and sericulture spread out to small farmers and their education. After short time silk production had spread over approximately half of the former imperial China.

Spreading of sericulture: from China to the rest of the world

China clearly realised the value of its sericulture, not only because of the end product but due to the knowledge gained over thousands of years about silk production, moriculture and processing of silk.

Referring to Silbermann (1897, in Jakobi 1932) a Chinese princess brought eggs of silkworms inside her headdress for the occasion of her marriage to Khotan in East-Turkestan (north-western China). This led to a sericulture industry that lasted for hundreds of years. In the year 552 A. D. two Nestorian monks smuggled silkworm eggs to Byzantium, which was the first step for expansion in the western direction.

The know how of silkworm breeding and of mulberry cultivation came to Korea and Japan with Chinese immigrants in between the years 200 B. C. to 300 A. D. (Zeuner, 1967).

A further expansion came with captures, conquests and population movements of Persians and Arabs. The Moors brought sericulture later in the 9th century to Sicily and Spain. From Spain, sericulture spread to northern Italy, the region that had most of the European important producer- and trade centres in the 15th century. Through annulment of the edict of Nantes 1685, the Huguenots were exiled. They took sericulture with then to Germany, Switzerland, the Netherlands and England. Due to less favourable climate conditions, these countries created a highly developed silk industry. This was the time of separation between raw silk producing countries and those of silk industry, referring to Jakobi (1932). An figure that still dominates the geographical structure of global silk production,

Alexander von Humboldt in1809, (Beck, 1991) tells of the importation of sericulture into Central-and South America by Europeans in the 16th century. However successful implementation of some experiments secured Mexico at this time (Jahnke, et al., 2001).

Reasons for shifting of sericulture

Availability of silkworms and mulberries is related to climate and ecological conditions (rainfall, temperature, relative humidity, soil quality, etc.). According to altitude and longitude, sericulture is focussed on regions between the 30^0 and the 35^0northern latitude. These are humid to sub humid tropics. The large genetic variability concerning mulberries as well as silkworms opens up many possibilities for breeding and selection, e.g. the expansion to the Fore Asia to approx. 45th latitude degree.

Even more spectacular, sericulture reached production levels up to the 60th latitude degree, e.g. coastal regions in Norway and Sweden.

The general technical know-how was mainly spread with imports of silkworms. The most important reason for expansion and changing denotation of sericulture is moreover of an economic nature. With increasing labour costs and few mechanisation possibilities the production of raw silk became unattractive. In Europe and Japan production practically disappeared completely. In the USA breeding attempts could not keep pace with other countries. In the meantime labour diversification between production of cocoons and trade oriented commercial processing to fabrics. Therefore China, India, Turkmenistan, Uzbekistan and Kirgisistan and newly also Brazil remain, as main producer countries while main processing countries are the USA, Italy and France (Jahnke, et al., 2001).

Developments in younger time

Worldwide silk imports reached a total value of US$ 448 million in 2001 (FAO 2002). Italy and Japan are the most important silk importing countries. The export oriented silk processing industry of Italy is completely dependent on imported raw silk material, of which Italy only buys the highest quality. In Italy an amount of 50 kg raw silk has a import value of US$ 1,275. The largest supplying country of raw silk for Italy is China, at it is for the global market.

Table 1: Silk, raw and waste production

Silk, Raw and Waste Production (Mt)	Year						
	1961	**1970**	**1980**	**1990**	**2000**	**2001**	**2002**
Brazil	101	259	1,300	1,693	1,500	1,400	1,450
China	6,268	13,516	35,393	55,003	78,201	94,201	94,201
India	1,264	2,258	5,041	11,800	15,197	15,000	15,000
Italy	761	310	18	2	12	12	2
Japan	18,680	20,516	16,155	5,721	650	559	559
Vietnam	200	300	360	500	3,000	10,000	12,124
World	32,503	45,762	68,741	83,401	106,991	130,771	132,434

Source : FAO statistics (2003) http://www.fao.org

The case of Japan is conspicuous with figures showing Japan as one of the most important global producers in 1961 (57% of world production) but decrease to 559 mt (0.004% of world production). Japanese production technology had been predominant in comparison to Chinese and Japanese international sale positions were even more superior. Since Japan's industrialization and non-agricultural income possibilities increased, national silk production was not profitable anymore. India pushed into this market gap but China was even stronger than some other countries. In consequence, total production figures grew four times from 1961 and 2002. Nevertheless, volume of world silk production is marginal in comparison to other textile fabrics.

In future, production probably will be shifted from richer countries to poorer ones. Sericulture will be moving more and more into tropical regions. Sericulture is seen as a connoting economic approach of development for rural areas, well suited for diversification of agricultural production. As a labour intensive agricultural production branch sericulture offers agricultural working places and income possibilities but also in preliminary and downstream industrial sectors, like reeling work, weaving mills, spinneries and dyeing factories. Additionally, the products of natural silk product can support diversification of agricultural export commodities. But introduction of sericulture with high hopes of easy and quick success are amiss.

Sericulture consists of strong time controls concerning the provision of inputs to follow phase production. Therefore not only production technology but also exact production programmes and dispensation systems for supply on schedule of breed have to be evolved for

implementation of sericulture projects. Also fresh cocoons are perishable goods and have to be either dried or reeled one week after cocooning. Implementation of silk production to export quality requires marketing measures to be created. These should be located together with cocoon-collection quality determination facilities and, if required, cocoon drying and cocoon storage places (FAO, 1980; Sengupta, 1989).

Sericulture also requires an intensive consulting service by professional personnel. Only through a tight connection between research institutes on regional level (e.g. in China on province level) and consulting services the ascertained technology transfer can occur. Research centres have to be built up with responsibility for breeding and development of adapted mulberry varieties and silkworms as well as to find solutions for production technical problems and the development of new technologies.

Demand for capital for sericulture is evaluated as dependent on production system intensity by different authors (Meenakshisundram, 1983; Patel, 1992).

Independent of the amount of investment required is the development of suitable credit programmes for small farmers and co-operation with credit institutions for financing is indeed important (Kusnaman, 1997). Sharifi (1994) points out that silk production presents an advantage concerning loan repayment due to harvests already available in the first year of cultivation in comparison to many other permanent cultures. Thus, a more rapid start date of repayment and recirculation of loan money is possible through sericulture.

Economy: success in industrialised countries

China is an example of integrated sericulture. Chinese silkworm breeding and the correlated mulberry cultivation produce a range. Moreover sericulture can be combined with tillage, animal- and fish farming systems (Riddle and Zhong, 1988). Figure 5 shows the diverse usage possibilities of by-products and wastes from the different production branches of sericulture.

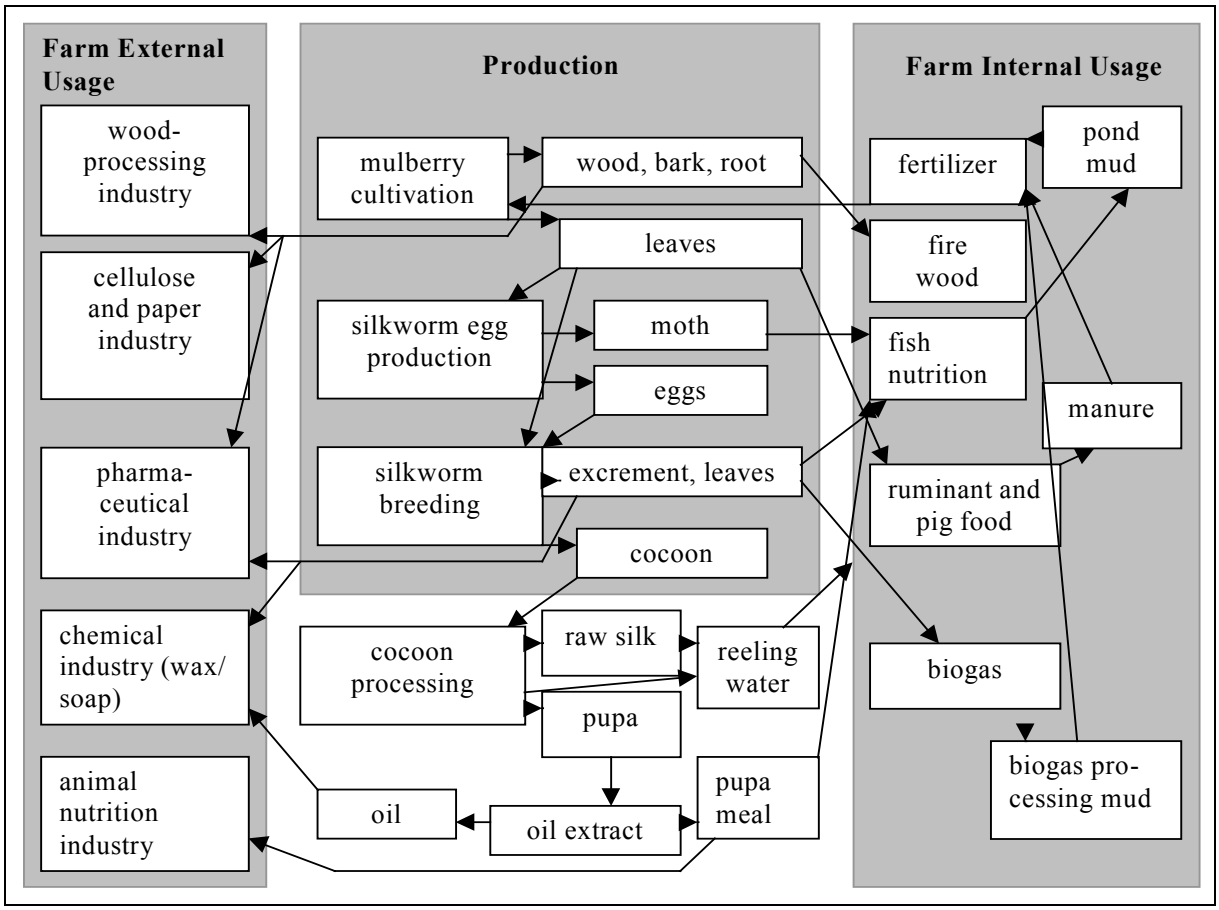


Figure 5 Structure scheme of usage of by-products

Source: Sharifi (1994), modified.

Increasing population densities made irrigated agriculture necessary for constant and higher yields. Meanwhile implementation of fishponds (aquaculture) became possible. That way, a stable and highly productive farming system is created. One system with mulberry trees is to grow them on hillsides with irrigated rice terraces, irrigated rice in shallow areas and ponds whose fish production is secured through wastes from silkworm breeding. The manifold interactions allow a maximum usage of resources (land and labour) and a stability of farming systems.

Stability or sustainability of farming system in addition to the production of silk is further advantage of sericulture in tropical regions.

2.3 Regional view

Thailand

Archaeological discoveries in the village of Ban Chiang in the north east province of Udon Thani have led experts to believe that Thailand's sericulture history may be as old as China's. An extensive burial site at Ban Chiang yielded evidence of a complex civilisation involving silk production that dated back over 4000 years.

In 1901, King Chulalongkorn made an attempt to upgrade the local silk industry by inviting a team of Japanese experts to aid production. In 1903, the Department of Silk Craftsmen was established under the directorship of Prince Phephatanapong. These early steps marked the beginning of rapid sericultural development in Thailand. Mulberry trees were planted in the northeast, local silkworms were cross bred with the Japanese variety and spinning looms were replaced by more advanced ones. Sericulture courses were taught throughout the Kingdom. By 1910, over 35 tons of silk were being exported annually
Despite the intricate role Thai silk played in high society, a flood of imported fabrics including fabulous silks from China, Persia and Japan made it difficult for local silks to compete. Thai sericulture remained a small cottage industry, most active in the Northeast around Korat, until the mid 20th century (http://iqproducts.8m.com/history)

Silk production gradually decreased over the following three decades due to a lack of government support and because of strong competition from foreign silks. An inability to improve antiquated techniques resulted in limited production.

The FAO reported that a two year project to produce disease-free silkworm seeds/hybrid eggs for sericulture farmers started in December 1997 with the additional objective to train staff of DoAE in sericulture (FAO, 2001). A special training component for the rural disabled was inserted in December 1998. Eight disabled farmers learned the method of cocoon processing with the newly developed reeling machine as well as the making of silk products for the raw silk.

The project's objective is to raise the net incomes from sericulture for approximately 8,000 farm households in the project area. The development and strengthening of farmer groups has been the foundation of all aspects of the project's fieldwork. The project works closely with the permanent staff of the DoAE including three Sericulture Extension Centres. The farmer groups are assisted in all technical aspects of sericulture production from mulberry planting to

fabric design and weaving. The project has facilitated contacts and marketing agreements between the farmer groups and a number of private companies.
By February 2000 the project had supported 45 farmer groups covering approximately 200 villages and 8,000 farmer members. Monitoring data show that production levels and incomes have increased significantly as a result of project activities.

In 2002 Thailand produced 1,510 mt silk (FAO, 2003).

Vietnam

Vietnamese sericulture began more than 3,000 years ago, probably under the influence of China, and has been practised ever since by most village families, largely for their own use and for the domestic market. Exporting started with the arrival of the French about 150 years ago and continued until the Second World War (ITC, 1997)

In 1985, the Government launched the Silk Integrated Agro Project (SIAP) for the promotion of sericulture. The Vietnam Union of sericulture Enterprises (VISERI) was established in Bao Loc as the agency responsible for management, development and trade. VISERI is part of the Ministry of Agriculture and Food Industry.
Viseri proposed recently that Bao Loc is not the only silk production centre in Vietnam, because the climatic conditions in the Lam Dong highlands certainly make it one of the country's most suitable areas for sericulture. The subtropical climate (22°- 29° C) contributes to the availability of fresh mulberry leaves all year round. Elsewhere in the country, fresh leaves can not be obtained for about three months in the year because of heavy rains or extreme heat, and cropping can be carried out only 7 - 8 times yearly (ITC, 1997)

The mulberry plantation increased from 36,500 hectares in 1994 to 100,000 hectares in year 2000. Many areas in the country, which are now planted with coffee or tea, could easily be used to sericulture. A shift may become attractive to farmers since the income of Sericulturists can be as much as four times as high as those of coffee or tea growers.
Sericulture is labour intensive and a one –hectare farm employs about 10 persons.
Vietnam is expected to develop into an important international supplier of raw silk and silk yarn (ITC, 1997).

The Viet Nam Sericulture Corporation (Viseri) in conjunction with authorities in Lam Dong Province recently conducted an inspection tour of all silkworm farming households in Lam Ha District, the country's largest locality specialising in the growing of mulberry and the

breeding of silkworms. It was found that in May and June about 4,000 households had incurred VND216 million (US$14,000) in losses due to poor-quality silkworm eggs imported from China. This loss was largely due to degenerated species of silkworms and spoiled frozen eggs. Chinese specialists in the inspection teams agreed that spoiled silkworm eggs are the main cause of damages to farmers and they vowed to compensate 60 per cent of losses to the farmers (Sai Gon Giai Phong, 2003)

The FAO reported that the silk production in Vietnam rose from 300 tons in 1970 to 12,124 tons in year 2002 (FAO, 2003).

Malaysia

Malaysia's small sericulture industry mainly produces cocoons for export to Japan. The producer is Permit Suterasemai, a subsidiary of The Terengganu State Economic Development Corporation. The company's 540 ha have an output of 640 tons of mulberry leaves every month. Silk eggs are imported from several countries, including Japan.
The country's imports of silk fabrics have risen rapidly in recent years, from 19 million USD in 1992 to 89.4 million USD in 1995 (ITC, 1997).

In the year 2000 the United Nations Office for Project Services (UNOPS) reported a silkworm development project in Malaysia. The project has two major objectives:

1 To lay the foundation for the modernisation of the sericulture sector in the country through investment support to selected less-advanced co-operative farms and institutions providing sericulture support services.

2 To help raise incomes and improve working conditions in the selected co-operative farms, particularly for women who constitute the majority of sericulture workers.

To achieve these objectives, the project finances the following components: improvement and expansion of existing sericulture production; capacity building of sericulture support services; training and pilot activities and support for project management.
This project will benefit about 2,900 members of sericulture work teams, equivalent to about 1,500 households or 6,100 people. It would indirectly benefit about 59,800 people additionally (co-operative members and their families) through increased incomes. Average incomes for workers in project co-operatives are expected to increase by up to 30% over 9 years.

In 2001 Malaysia exported 29 mt reelable cocoons (FAO, 2003).

Indonesia

Attempts at developing sericulture in the Indonesian Archipelago date back to the 18th century. Zwaardecroon (1718-1725) and De Haan (1725 –1729), at that time Indonesia was a colony of Netherlander, Indonesia have produced silk yarn 34,5 lbs and exported 300 lbs to Netherlander in year 1735 (Atmosoedarjo, et al., 2000).

The modern sericulture and silk processing industry in Indonesia started in 1950 when some Indonesian war veterans supported by ex Japanese war veterans initiated the sericulture industry as a home industry to support the existing traditional silk weavers with raw silk as their raw material to produce traditional silk fabrics. The government appointed the Forestry Department to develop Mulberry Plantations and sericulture at the borders of forests, to protect the forest from people who destroyed forest for wire wood. By providing to forest workers, a barrier was created to protect the forests, especially on the island of Java (Moerdoko, 2002).

Cocoon production in Indonesia reached its highest level between 1962 and 1966, but collapsed in the 1970s due to the spread of the pebrine disease.
From the 1990´s rising cocoon prices led to a production increase. Development of silk production efforts are now concentrated on smallholder areas.

According to data obtained from the Indonesian Natural Silk Community and the Sericulture Station in Bili-Bili, South Sulawesi, the farmers involved in sericulture production increased from 7,462.00 families in 1991 to 12,631.00 in 2001 (see table 2)

Table 2: Sericulture Developments in Indonesia 1991 – 2001

Year	Mulberry (ha)	Fresh Cocoon (ton)	Raw Silk (ton)	Farmers Involved (family)
1991	5,748.00	1,002.24	135.00	7,462.00
1992	7,760.00	1,072.44	161.00	11,185.00
1993	8,165.00	1,192.00	174.00	11,185.00
1994	8,418.00	925.51	130.00	10,045.00
1995	6,682.00	938.93	135.00	10,547.00
1996	7,944.0	586.44	80.00	10,551.00
1997	7,021.00	463.89	67.00	8,359.00
1998	8,066.00	458.53	70.40	8,451.00
1999	9,858.00	595.05	74.38	10,195.00
2000	10,026.00	483.50	72.56	9,603.00
2001	12,551.00	744.86	110.36	12,631.00

Source: Department of Forestry 2001

2.4 Development objectives and the economic challenge

Most developing countries are raw material producers of agricultural commodities. Income generation in developing countries is therefore often dependent on agriculture in the form of small farming systems. Rural regions make about 70 - 90% of governmental areas in most of the world's developing countries. Table 3 shows the rural population and population density of five big developing countries in South Asia.

Table 3: Rural population and -density of developing countries in South Asia in 1999/2000

No.	Country	Land Area thousand sq. km	Population millions	Rural Population millions	Rural Density people per sq. km of arable land
1	**Indonesia**	**1,812.00**	**210.40**	**124.14**	**694.00**
2	**Vietnam**	**352.00**	**78.50**	**59.66**	**1,031.00**
3	**Thailand**	**511.00**	**60.70**	**47.35**	**323.00**
4	**Philippines**	**298.00**	**75.60**	**30.10**	**566.00**
5	**Malaysia**	**329.00**	**23.30**	**10.20**	**541.00**

Source: World Bank Statistics (2002).

In general, the rural population is sensitive to climatic or seasonal changes and thus, changes of market prices but moreover is strictly dependent on their resources (labour and land) as a source and insurance of income.

In Indonesia income figures vary between rural and urban areas. In this case, income per capita should be differentiated into two levels of income, as the urban income is relatively higher than that of the rural population. The data for Gross National Income (GNI) and Gross National Income per capita are shown in table 4.

Table 4: Gross national income (GNI) and Gross national income per capita

No	Country	GNI $ Billions	GNI per capita	Rank
1	Vietnam	30,4	390	164
2	Indonesia	119,9	570	153
3	Philippines	78,8	1040	131
4	Thailand	121,6	2000	103
5	Malaysia	78,7	3380	84

Note: per capita in 2000 Year.
Source: World Bank Statistics (2002)

For the Indonesian rural population income generation is an important aspect. From the sustainable development point of view that this kind of development assistance is a great advantage for:

- cash-availability for educational purposes,
- low productivity sector agriculture,
- national problem of growing gap between poor rural and rich urban,
- diversification and increasing productivity of agriculture

3 Project Idea

3.1 Modelling the "with - and –without" situation

The project idea is based on the possibility of generating additional income for rural households in Central Java, Indonesia through adopting silkworm/ cocoons production. For simplifying the complexity of Indonesian households, six types of rural households are chosen as exemplary models. The first three are farmers in activities "without sericulture". The last three ones are farmers "with sericulture" in different land categories, starting from: 0.30 ha (small size of farm); 0.50-0.90 ha (middle size of farm); 1.00-3.00 ha (larger size of farm).

Ex ante:

Case History

Income:

i. Bapak Sarna, from Kaliori, with three children receives Rp.1,600,000 (USD 190.48)[6] for his one-hectare corn field (3 months). However he pays out about Rp. 1,000,000 of this on fertilizers and pesticides. So he receives about Rp. 600,000 per 3 month. (Rp.200,000 per month). His wife also works with a monthly income Rp. 150,000,-. Total income of family Rp.350,000 (USD 41.7) a month.

ii. Bapak Mamad, with four children receives Rp. 1,300,000 per 6 month for his produce of peanuts and cassava (Rp.217,000 a month) for one hectare. His wife works for Rp. 150.000 per month. Total income of family Rp.367,000,-(USD 43.7) a month.

iii. Bapak Karno with his wife work as farm labourers. The average monthly wage of a farm labourer is Rp. 200,000 (23.8 USD). A husband and wife will earn Rp 400,000 (USD 47.6) a month

The average income for one farm family is about 500 USD a year.

[6] Exchange rate: 1 USD = Rp. 8400

Expenditure:

Five persons per family for food	Rp. 10,000 x 30 = 300,000
Other basic expenses and school fees (daily)	Rp. 2.000 x 30 = 60,000
Monthly expenses for small farming famil	*Rp. 360.000 (USD 42.9)*

(Banyumas Sutera Alam, 1998)

Ex post:

The gross income of silkworm production excluding running monetary inputs for eggs, disinfection agents, fertilisers, without opportunity costs, is 879.59 USD
~ 75.00 % income increase.

Investment is required only for planting mulberries and building worm houses at the beginning.
Table 5 shows that the model of sericulture production will generate an increase of 75 % over the current income. With this result, the project idea gains attraction as a possibility of income generation in rural areas.

Table 5: Net benefit increase of sericulture production (in USD) [7]

NBI Calculation of middle land of sericulture production					
Net benefit increase (expected)				Disc. Factor at	Present worth of incremental at 12 %
Year	Without project	Sensitifity of income:	100%	12%	100%
		Project	Increment		
1	500.00	160.00	-340.00	0.89	-303.62
2	500.00	550.71	50.71	0.80	40.57
3	500.00	702.20	202.20	0.71	143.56
4	500.00	1190.00	690.00	0.64	441.60
5	500.00	1190.00	690.00	0.57	393.30
6	500.00	1190.00	690.00	0.51	351.90
7	500.00	1190.00	690.00	0.45	310.50
8	500.00	1190.00	690.00	0.40	276.00
9	500.00	1190.00	690.00	0.36	248.40
10	500.00	1190.00	690.00	0.32	220.80

	Income
NPW	2,122.17
Capital Recovery Factor	0.176984
Annuity	375.59
NBI	75%

[7] The calculation estimated by using 0.50 land mulberry. At the first year: 0.50 box/period and 5 times; second year: 0.75 box and 10 times; Third year:1 box and 10 times; Fourth to tenth year: 2 boxes and 10 times. Harvest = 25 kg fresh cocoons/box. The price of fresh cocoons per kg Rp. 17,500,- (1st and 2nd year) and Rp. 20,000,- (3rd to 10th year)

FAO (1994) explained that income-generating activities in the countryside can be adopted, if the rural dwellers can boost income and living standards through a number of rural activities: crop and livestock production, processing, para- non-agricultural, artisanal and commercial activities. All these activities must fill full certain conditions: In addition to being technically feasible, they must also be economically and financially profitable. The income-generating activities should be profitable, that is to say they should produce substantial increase in income or surplus (one could also use the term profit) as a result of labor inputs.
If we the term "substantial increase" (rather arbitrarily) as 50%, the project idea can be said to have passed its first test.

3.2 Estimating the comparative advantage

Besides a comparison of sericulture production with the current revenue in rural areas, sericulture should be compared with alternatives in crop production. Table 6 shows a comparison revenue between sericulture and three other crops, which are grown in rural areas in Central Java.

Table 6: Comparison revenue between sericulture, cassava, maize and peanut per one hectare (in USD)

Description	Expenditure	Revenue	Profit
Sericulture	1,377.00	1785.00	408.00
Cassava	206.24	357.14	150.90
Maize	402.61	568.93	166.32
Peanut	365.48	714.29	348.81

Note:
Sericulture was assumed in fourth year, 3 boxes, ten times harvest per hectare per year (BSA,2002)
Paddy was assumed twice, maize three times and cassava one harvest per hectare per year.
Source: Sudaryono (1994) in Adisarwanto, T. (1999), Rukmana (2001), modified.

Revenue from sericulture is higher than from cassava, maize or peanut. Sericulture shows higher economic profitability, however it may not be easy to adopt, because peanut, maize and especially cassava, do not require intensive daily labour.
Generally, it can be seen in the results in table 6 that sericulture is competitive with peanut, maize, and cassava.

3.3 First conclusions – what is concrete and what is virtual?

In the model presented for income generation the NBI calculation resulted in an increase of 75%. For reality, this economic and financial profitability can only be obtained through using the following social factors:

a. As a new crop, production sericulture requires an introduction program for farmers. It should be first cultivated in a demonstration farm. The goal of the farmer should be to demonstrate best management of sericulture production and innovative technologies, and illustrate that farmers can increase their income with a sericulture activity. The farmers should be trained with practical skills in sericulture.

b. Sericulture is a highly labour intensive sector but does not require high-tech scientific skill and expertise. According to Ryu (1998) three boxes silkworm require two workers per day during eighteen days.
   Indonesian Office Statistic (BPS, 2003) stated that in Central Java the average number of household members in a family is more than four people. This indicates that labour is available and it can be replaced with family labour.

c. Sericulture requires also large land.
   To cultivate mulberry plant, the land that farmers should use is, where there is no need to cultivate high commercial crops such as paddy, horticulture or fruit crops. However, mulberry can be planted on arable land.

d. Sericulture requires investment capital to cultivate mulberry plants and worm shed. At the given low income level of a farmer, capital requirements are in conflict with consumption needs. The farmers need credit.

e. Sericulture needs an organisation of management. Cycle of worm consists two groups' early instar silkworm and mature silkworm. The early instar silkworm requires intensive cultivation, higher hygienic and clean isolated rooms than mature silkworm larvae. The nucleus-plasma methods should be implemented. The nucleus cultivates early instar silkworms and plasma cultivate mature silkworms larvae.

4 The Study Phase

4.1 Assumptions and sensitivity analysis from a theoretical point view

Assumptions and the models

The three models of sericulture production with different farm sizes, starting from: 0.30 ha (small size of farm); 0.50-0.90 ha (middle size of farm) and 1.00-3.00 ha (larger size of farm) were assumed for the present study.

The tropical climate in Central Java allows the mulberry to grow during the whole year so that sericulture production is practicle every month. Five sericulture period cycles were assumed in the first production year due to the growing phase of mulberry trees which takes six months. For the 2nd to 10th production year a number of ten period cycles were assumed. The project models were also calculated for ten years.

The summary of the investments for these three farm sizes is shown in table 7.

Table 7: Investments of sericulture production (in USD)

No	Description	Mulberry section	Silkworm section	Total
1	Small (0.30 ha)	120.86	283.33	404.19
2	Middle (0.50-0.90 ha)	201.44	398.51	599.95
3	Larger (1.00-3.00 ha)	400.00	422.94	822.94

The mulberry section includes costs for land preparation, fertiliser, mulberry cuttings and mulberry planting, grass pruning and labour costs.

The silkworm section includes the shed building and accessories for rearing. The details of the calculations of investments will be discussed in the following chapter.

Revenue of sericulture is presented in table 8.

Table 8: Revenue of sericulture production per year (in USD)

No	Description	1st year	2nd year	3rd year	4 to 10th year
1	Small (0.30 ha)	85.00	367.00	420.00	595.00
2	Middle (0.50 – 0.90 ha)	128.00	441.00	562.00	952.00
3	Larger (1.00 – 3.00 ha)	235.00	734.00	1,244.00	1,785.00

Sensitivity analysis

Sensitivity analysis is the study of how the variation in the output of model (numerical or otherwise) can be apportioned, qualitatively or quantitatively, to different sources of variation, and of how the given model responds to upon the information fed into it. Sensitivity analysis was created to deal simply with uncertainties in the input variables and model parameters (Saltelli, A, et al. 2000).

Marshall. (1999) stated that sensitivity analysis measures the economic impact resulting from alternative values of uncertain variables that affect the economics of the project. When computing measures of project worth for example, sensitivity analysis shows just how sensitive the economic pay-off is towards uncertain values of a critical input, such as the discount rate or project maintenance costs expected to be incurred over the project's study period. Sensitivity analysis reveals how profitable or unprofitable the project might be if input values to the analysis turn out to be different from what is assumed in a single-answer approach to measuring project worth.

In this study, sensitivity of cocoon production is simulated and real variability of these important attributes is examined.
Sensitivity analyses have been carried out on four of variables: income variables. The current values of variables are shown in table 9.

Table 9: Current value of variables

No.	Variables	Unit	Value
1	Frequency of production cycles per year	Period	10
2	Fresh cocoon production per box	Kg	25
3	Total of grownup worm boxes per production cycle	Box	3
4	Price of fresh cocoons per kg	USD	2.35

4.2 Sensitivity and criticality in practical terms

The variables within the presented sensitivity analysis it was assumed at twenty percents of variation. The results are shown in table 10.

Table 10. Results of income with sensitivity analysis at 20% decrease of values (USD)

Year	Without project	With project sensitivity analysis at 20% lower income		
		Small (0.30 ha)	Middle (0.50-0.90 ha)	Larger (1.00-3.00 ha)
1	500	68	128	188
2	500	294	441	587
3	500	336	562	995
4 to 10	500	476	952	1,428

Table 10 shows the new Income of the three models of the project in USD for 10 (ten) years of 20% lowering of incomes.

There still was a marked increase in the medium and larger size groups after joining the project.

The middle increased from 500 USD to 562 USD or by 12.40% in the third year and 952 USD or 90% up in fourth to tenth year and the larger improved to 587 USD or 17.40% in the second year 995 or 99.00% in third year and 1,428USD or 185.00% up in the fourth to tenth year. Unfortunately, no increase in income for small size of farms was found.

It can be seen that larger size of farms has an increase in income, even starting in the second year. However, large size of farms require more labour. There is a need for family labourers to be available, otherwise labourers have to be hired and the income will decrease.

4.3 Challenges and limitations in this planning phase.

Challenges in this phase:

As presented in the above sensitivity scenarios the project might be confronted with challenges as how to deal with changes in factors influencing the income of Sericulturists. Thus, on the one hand it can be seen that changes in production costs can take a great influence on income figures. The case of an increase of input costs required for sericulture will lead to a decreased income in the starting years. The challenge will be to determine and operationalise as to handle the single aspects that have influence on the costs.

On the other hand, a great impact is detected in the aspect of decrease of income. It has to be paid attention to production factors that have an impact on income figures of small land sizes of rural farm households joining the project. In the above calculations it was explored

that particularly the small ones need support in cases of income changes. Consequently, aspects that influence the income for those, thus, the small size sericultural harvests require a close and intensive consultation for farmers in their first years.

Limitations in this phase:

"Worst case scenario"
In this following part a sensitivity scenario of lower income was explored again with a decrease of 50% income. The results are shown in table 11.

Table 11. Results of income for sensitivity analysis at 50% decrease of income (USD).

Year	Without project	With project sensitivity analysis of 50% lower income		
		Small (0.30 ha)	Middle (0.50-0.90 ha)	Larger (1.00-3.00 ha)
1	500	43	80	118
2	500	184	275	367
3	500	210	351	622
4 to 10	500	298	595	893

As presented in the scenario for the critical cases, a limitation can appear in times of decreasing income down to 50%. The project's success is then limited for a larger size of farms until the third production year, for a middle size farm it would be until the fourth year and for the small size farm one there is no legitimation for sericulture in that case.

Environmental issues:

An environmental impact analysis report was completed by consultants in May 1997. The report concluded that no significant environmental concerns were present. Mulberry cultivation rather supports soil conservation and the pruning reduces unsustainable harvesting of fuel wood (World Bank, 2001).

5 The Project Plan

The project plan is evolved to present and coordinate a structure to ensure that stakeholders are consulted, and defines key decisions, information requirements and responsibilities at each phase in the life of a project. Required preparation, implementation and evaluation are feasible and accomplished. Drawing up the project plan evokes a differentiation of two participating groups.

5.1 Organizational structure

The two differentiated aspects may be described as "nucleus" and "plasma". The name "nucleus" determines the non-governmental organisation Banyumas Sutera Alam and the "plasma" that means farmers of several regions in Central Java that surround Banyumas Sutera Alam. Organisational aspects concerning the planners, participants will be presented in detail. Figure 6 shows the separated activities of "nucleus" and "plasma".

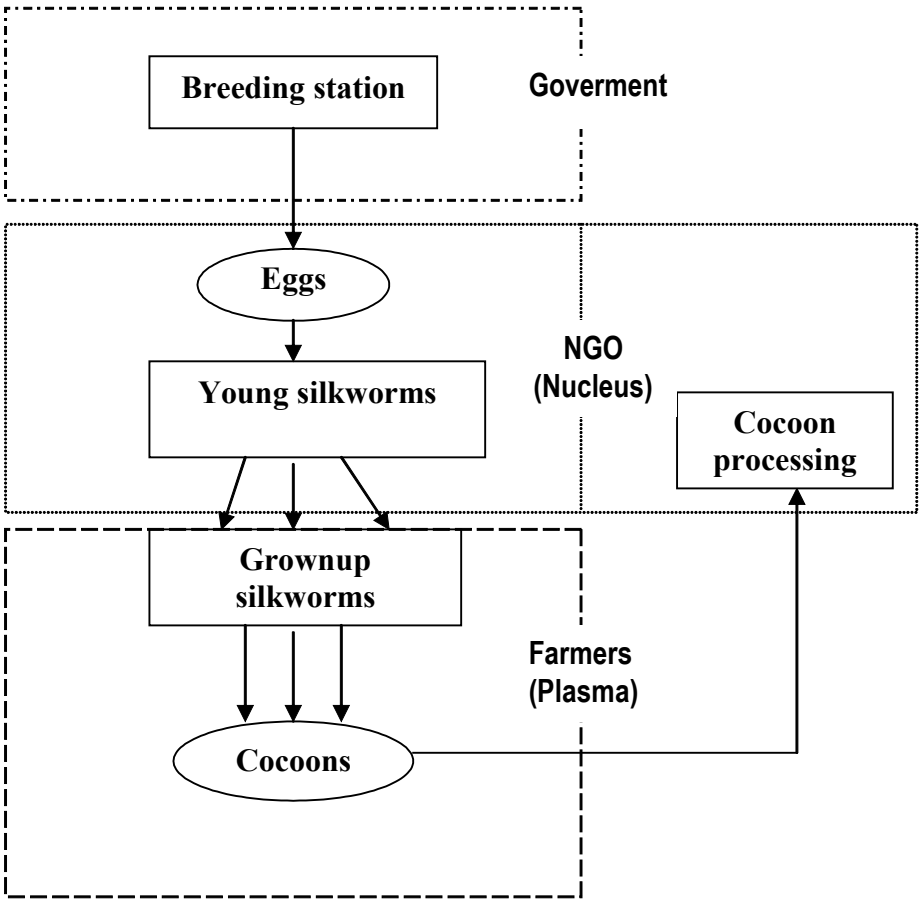


Figure 6. The Activities of nucleus and plasma.

The institution that is providing the Non Government Organization with silkworm eggs is a breeding station run by the government. The supplement, reaching from delivery of eggs until giving young silkworms away to farmers is done by the Non Government Organization. Farmers provide advanced silkworms, feeding the worms for two weeks and waiting for one week for processing of cocoons. The harvest of fresh cocoons is sold to the Non Government Organization.

The Non Government Organization takes on responsibilities for spreading of sericulture, silk production among rural smallholders and buys their produced fresh cocoons. Further processing of bought cocoons is then accomplished by the Non Government Organization. Simultaneously, Non Government Organization has also established market and technical assistance network with Indo Jado Sutera Pratama, Ltd. Co., a local silk thread factory. Indo Jado would buy the silk worm cocoons produced by the farmers and provide technical assistance to the farmers to improve their skill in silkworm farming to enable them to produce better cocoons. These products are sold on local markets to guarantee sustainability of the project.

5.2 Activities and actors

Banyumas Sutera Alam is a new Non Government Organization specialize in silkworm farming activity, in Kaliori-Village, Banyumas, Central Java, Indonesia. Banyumas Sutera Alam is part of Yayasan Sosial Bina Sejahtera (YSBS), founded 1972, is a non-profit organization that belongs to Catholic Church diocese in Central Jawa.

Banyumas Sutera Alam started the cultivation of silkworm farming in 1997 with a mission to help village people to have more prosperous life through silkworm farming.

BSA has functions as a coordinator, young worm producer and purchaser of fresh cocoons. Activities are being planned as follows:

5.2.1 Preparation

An Experimental Project (EP) and on-farm demonstrations (Pilot Project /PP) are carried out before sericulture is promoted to potentially participating farmers. EP tests the sericulture production in project areas, including mulberry cultivation and silkworm production. On-farm demonstrations increase participation of farmers due to easily comprehensible training courses. The farmers can see and learn practically how sericulture production is executed and how it positively affects their income. Participation often increases when farmers have conceived thoroughly how to carry out sericulture.

The Experimental Project is planned for one year and a Pilot Project is prepared for two years (see figure 8, page 64).

For mulberry cuttings required by participating farmers the Non Government Organization has planted sufficient supply of mulberry trees. To cultivate an area of 1 ha mulberries an amount of 20,000 mulberry cuttings are needed. Mulberry cuttings can be cultivated from the branch of the mulberry tree itself. The Non Government Organization cares for distribution and supply of mulberry cuttings from the Experimental Project so that farmers get cuttings on time to begin cultivating. After one-year growth farmers can transfer mulberry cuttings again to other farmers.

5.2.2 Training and extension service

Training has to be conducted after farmers display interest in joining sericulture activities. Training courses give practise oriented know-how. After the training, the farmer's land is surveyed. This survey is needed to investigate and gain certainty of the availability of such production factors as the following: size of land for cultivation; height of location levels and availability of family labour. The training courses are conducted in the raining season (from October to March) because farmers can successfully cultivate mulberry trees. The water is available, they can plant mulberry cuttings.

Extension services are an important element within the array of market and non-market entities and agents that provide human capital enhancing inputs, as well as flows of information that can improve farmers` and other rural peoples` welfare; an importance long recognised in development dialogue (Leonard 1977; Garforth 1982; Hazell and Anderson 1984; Jarret 1985; Feder, Just and Zilbermann 1986; Roberts1989 in Anderson and Feder 2003).
The Goal of extension services in this project is to give information or solutions to farmers involved in sericulture. With this service the farmers are to be controlled and supported.

5.2.3 Credit system

The investment required for a sericulture production unit amounts to about USD 404 for small land, USD 600 for medium and USD 823 for larger land (see table 7). Because the target group is defined as small farmers in the rural area the farmers' financial capacity is not given. The farmers would have to be provided with an adequate credit program (Henny, 2002)

Credit supports farm development in at least three ways:

- Credit programs with low interest rates help small farmers to solve the capital problem.
- Credit programs help small farmers to get farm inputs to the farm.
- The farmers, who join a credit program, also get the training and consulting service. (Hermanto, 1992).

5.2.4 Organisation of cocoon production

The following activities need to be organised:

5.2.4.1 Silkworm egg ordering

The silkworm egg producer is a governmental breeding station and the eggs have to be ordered a minimum of two weeks before they hatch. The orders for eggs by the farmers („plasma“) are collected by the Non Government Organization (NGO) staff and they ultimatively give these orders to the breeding station.

5.2.4.2 Early instar silkworms cultivation and distribution

Egg hatching and early instar silkworm cultivation are very sensitive and require high hygiene. Therefore, the incubation chamber and all utensils have to be properly sterilized before beginning the process of incubation. The young silkworms should have uniformity of growth. Uniformity of growth is important for the next growth stages so that the mature silkworm can spin cocoons at the same time, and the farmers also can feed the mature silkworms and harvest the cocoons at the same time.

Distribution of young silkworms to the farmers is accomplished in the morning. It avoids high temperatures and overhead sun. Distances between farmers should be logistically well organised so that distribution runs efficiently. The hatch of eggs, young silkworm cultivation and their distribution require many operations and high costs, but it is important to do if the farmers are not sufficiently experienced.
That system can be changed in future by the time the farmers have gained experience and are technically skilled.

5.2.4.3 Fresh cocoons purchase

The fresh cocoons are sensitive to mechanical influences and can be broken easily. Therefore, cocoons should either be processed or dried within five days after harvesting.
The farmers bring fresh cocoons in sacks and sell them to the NGO. Fresh cocoons will be

tested and selected. The price depends on the quality of delivered cocoons. Prices are fixed according to the following conditions: 1) the percentage of broken cocoons and 2) texture of cocoon skin (see appendix 1).

5.2.4.4 Processing of cocoons

The fresh cocoons can be processed to dried cocoons, raw silk, thrown silk and cloth. For efficient production the NGO organises the total cocoon harvest; in other words, the amount of cocoons that should be produced for every month.

5.2.5 Marketing of products

For sustainability of the sericulture project, silk products need to be sold. The silk products are dried cocoons, silk yarn and clothes. The products can be sold at domestic markets and export market.

Export markets need large quantities and high qualities. Table 12 shows cocoon grading for international markets.

Table 12. Cocoon grading

- Results of cocoon filament length

Cocoon filament length (metres)	Less than 800	From 891 up to 960	From 961 up to 1030	From 1031 up to 1100	From 1101 up to 1170	From 1171 up to 1240	From 1241 up to 1310	From 1311 up to 1380	From 1381 up to 1450	More than 1451
Points	38.0	38.5	39.0	39.5	40.0	40.5	41.0	41.5	42.0	42.5

- Results of reelability

Reelability (%)	Less than 39	From 40 up to 46	From 47 up to 53	From 54 up to 60	From 61 up to 65	From 66 up to 70	From 71 up to 76	From 77 up to 80	From 81 up to 85	More than 86
Points	47.0	47.5	48.0	48.5	49.0	49.5	50.0	50.5	51.0	51.5

- Cocoon quality grading

Grades	**4th grade**	**3rd grade**	**2nd grade**	**1st grade**	**Excellent**
Points	Less than 87.5	88.5 88.0	90 89.5 89	91.0 90.5	More than 91.5

Source: Veda, K. (1997) p. 300, modified.

The price for an excellent cocoon quality is the highest cocoon price. The excellent cocoons have a filament length of minimum 1171 metres and a reelability of a minimum of 61 percentages. The lowest quality is the 4th grade. Standard quality is commonly defined as a grade of "2A".

5.2.6 Project personnel

To achieve the above named activities the NGO requires special personnel. The persons that should be employed are:

a) <u>Project Manager</u>

Projects are recommended to designate or hire a project manager with a background in sericulture production and project management to coordinate the team effort. The level of effort required is to be determined by local needs. Duties include coordination of all project activities thus, tracking and reviewing progress and ensuring that efforts are directed towards the project goals and coordinating project report preparation. The structure of the project organisation is presented in figure 7 below.

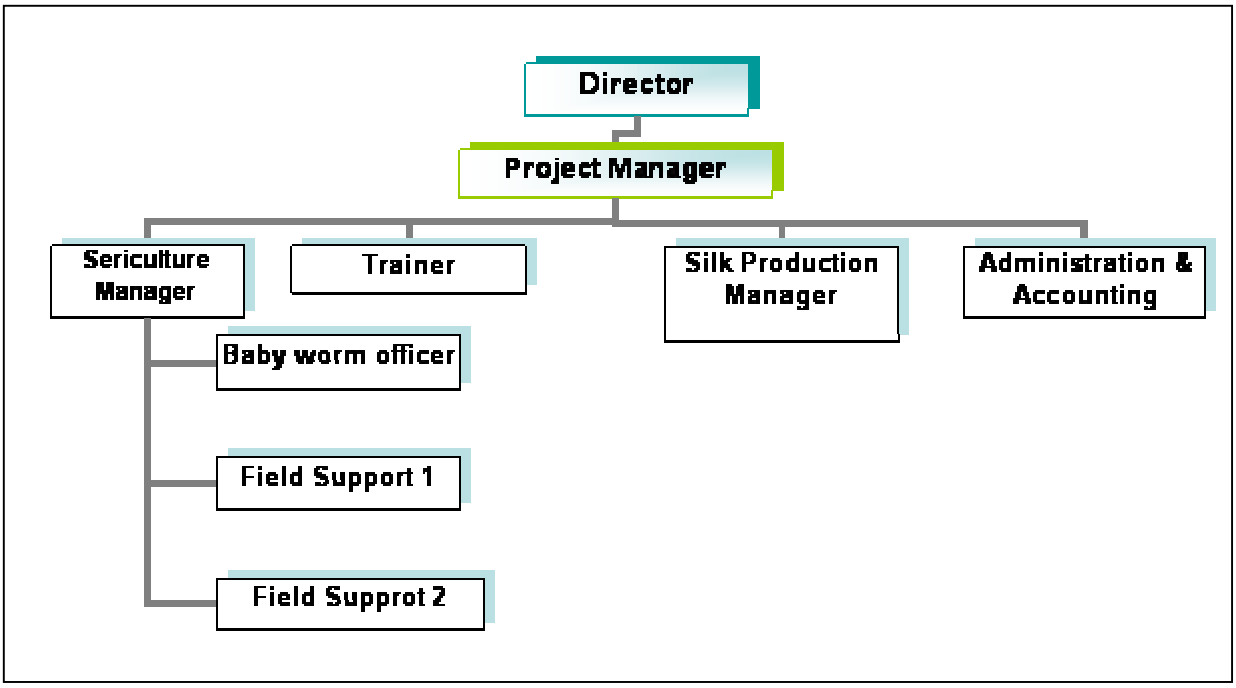


Figure 7. The Structure of project organisation

A project manager organises three sections: Sericulture, administration and processing of cocoons section.

The sericulture section comprises responsibilities for training the farmers, young worm cultivation and distribution, extension services for the farmers. A responsibility concerning the administration section is for administration works, credits and purchasing of cocoons. The processing section includes responsibilities for cocoons processing, silk yarn and clothes.

b) Technical Support Manager of sericulture production

Future projects should employ core staffs that are informed in detail about the project activities of participating agencies. Assigning personnel to the project for a specified time period of two to three years during implementation helps to ensure they give the project proper attention, are accountable for progress and feel a sense of ownership in the project. Participating agencies must ensure that adequate staff time is allocated for each aspect of the project, including follow-up and report preparation, both key components of effective technology transfer.

The project's Technical Support Manager is responsible for mulberry section, young silkworm cultivation at "nucleus"-area and cocoon production at "plasma"-areas. He/she will be supported by field staff.

c) Trainer and field staff

Specialised agents commonly are employed after completing advanced formal training in their area of specialisation. To be effective, however, they also need competencies in the extension education process. In addition, they must understand the human development of learning, social interaction processes and they must become knowledgeable about the organisation within which they work.

d) Technical assistance

In order to produce high quality cocoons, the whole silkworm cultivation process must be done with care. One of the important factors is for farmers to cultivate the silkworms with using the methods given in the training course. The Banyumas Sutera Alam`s supervisors should be providing assistance to farmers. Because the silkworm cultivation is a new activity, the availability of technical assistance is perceived as valuable because it can give farmers success in the project.

e) Administration and accounting personal

Scopes of work for these positions are to manage activities administration and the bookkeeping of all cash flows in the project.

5.2.7 Farmers

a. Target groups

The target groups are small farmers in rural area in Central Java, who have their own land for planting mulberries and have family labour available.

The Project will impact directly on the disadvantaged farmers; -they are the villagers who are the underprivileged group of society eking out a subsistence level of living. They were born on the land. Their parents have no education, are illiterate, -their children often dropout of school at primary level due to lack of motivation.

The whole family can be involved in the cultivation of silkworm, grand parents, parents and children can all participate in the harvesting of the mulberry leaves and feeding the silkworms which is a task carried out 3 times per day and in the cleaning and disinfecting of the silkworm shed.

b. Promotion of Women

This project will also improve the life of women in the following ways:

- The cultivation of silkworm is not physically demanding work so village women who need to supplement the family income can carry it out.
- Women will be involved in the administration of the project especially in the running of the cooperation.
- In the cocoon sorting stage female labor is more suitable as it demands patience, - also in the spinning and weaving of the Silk, 90 % of the labor force is women.
- By offering working opportunities to the women it will increase their income and also create an incentive to avoid young marriages which is still a social problem in the villages.

c. Beneficiaries

As more farmers realize the potential in silkworm farming they will change from seasonal dependent crops to mulberry plantation. Within the first 5 years of the project 2500 farmers will be targeted with the training and support programs. Potentially 10.000 people can improve their conditions.
Employment will also be available in the spinning and weaving and garment making when they come on line in 3-5 years from the start.

d. The activities of farmers

Mulberry cultivation

The processes of planting mulberries are: preparing of land, planting of the mulberries cuttings, harvesting mulberry leaves and cutting of branches.
The cuttings of mulberries must be free from diseases, be aged from three and half months olds and must come from prime seeds. Farmers directly plant the cuttings in the cultivated and fertilized land.
The first harvest of mulberry leaves is up to six months after planting and leaves can be harvested every day for one month. The next harvest is three months after cutting of the branches.

Cultivating silkworm

Because of the high risks and the quite expensive tools and know how included, farmers start to rear silkworms in the 4th instar. Banyumas Sutera Alam does the silkworm rear until 3rd instar.

Before the rearing of the silkworms, farmers empty and clean the rearing shed.

Feeding the silkworms with fresh mulberry leaves is done three times a day: morning, noon and evening

It takes around 20 days from 4th instar until the cocoons can be harvested. The silkworm rearing can be done for 8-10 periods per year.

5.2.8 Phasing of the activities

The complete project is divided into four overlapping phases:

a. Experimental Project (EP)

b. Pilot Project (PP)

c. Nucleus Project (NP)

d. Industry Project (IP)

The Overview of the project plan is shown in figure 8.

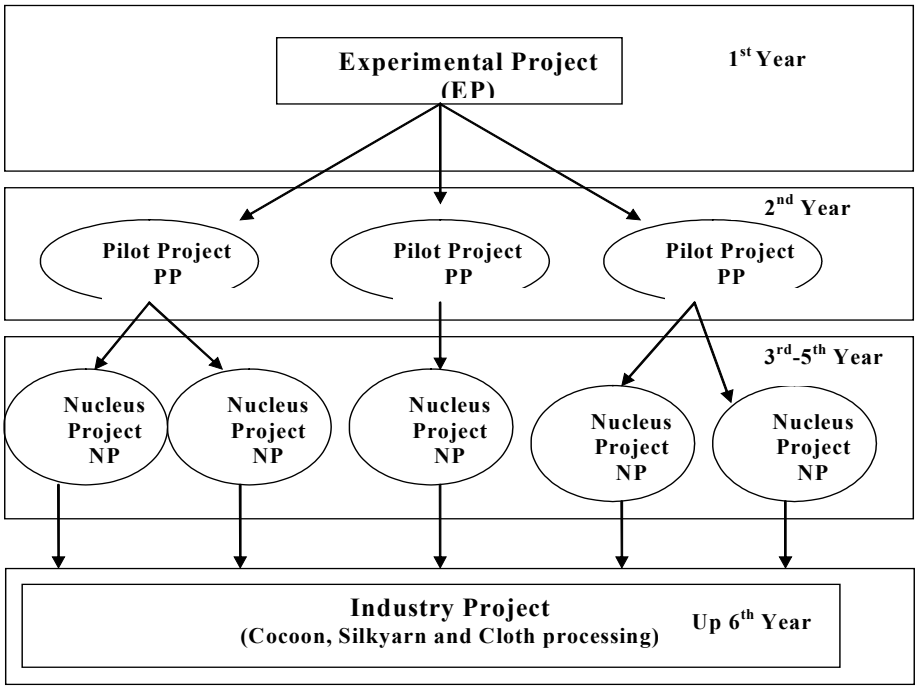


Figure 8. The Silkworm project plan BSA

Source: BSA (1998), modified

a. Experimental Project (EP)

The project duration is 18 months. The project area is situated in Kaliori Village, Banyumas, Central Java and covers 2 hectares.
This Stage is to experiment in both the cultivation of various varieties of mulberry plants and breeding of silkworms to the stage of producing cocoons. In other function this stage is as source of mulberry cuttings for the next project stage (Pilot Project).

The materials from of these plants will be used for further planting of ten hectares on the assumption that this planting will provide:

1 Hectare block : 20,000 Mulberry plants

1 Mulberry plants : 10 cuttings

1 Hectare (Production) : 200,000 cuttings

From 2 hectares we will produce 400,000 cuttings.

Our quota for the pilot stage (10 hectares) is 200,000. The remaining 200,000 cuttings will be divided between the farmers who attend our training courses.

The progress of the Experimental Phase will be carried on at the same time as Phase II (Pilot Project) and Phase III (Nucleus Project).

b. Pilot Project (PP)

The project is planed for duration three years with the area 50 hectares in five locations of 10 hectares each. The reason for choosing 5 locations is to attract more farmers who will be able to see the progress of the project in their own locality.
The overall goal of this project is to improve the living standard of the targeted farmers by enabling them to increase their income through silkworm farming. Each farmer family will manage approximately 0.02 hectare of mulberry plants. At the same time, using the now-grown mulberry, the farmers will also start rearing the silkworms, which eggs will be supplied by the project partners on low interest credit system. The project partner will buy the cocoons from the partners and sell them to Indo Jado company.

The Objectives for this stage are:

- Training program 600 catalysts for the cultivation of both mulberry plants and silkworm to the stage of producing cocoons.

- Preparation of land
- Supplying mulberry cuttings for the farmers for planting
- Supplying fertilizer, pesticides,
- Supplying materials for the farmers to construct simple sheds and racks for the silkworm.
- Supplying the early instar silkworms to the farmers
- Receiving the cocoons and sorting and drying them

Training courses will be carried out 10 times each year with 20-25 farmers per course. 200 farmers will be trained each year. The training centre will be at Kaliori as the infrastructure is already available, including meeting and accommodation facilities.

After the farmers complete the course they will practice their training in their own locality.

c. Nucleus Project (NP)

Duration of the project is for 5 years with an area for 2,500 hectares in 5 locations of 500 hectares each.
In this phase the BSA acts as the catalyst and the farmers as the nucleus.
Cooperation between the two is as follows:

Banyumas Sutera Alam's Role :

- Continuing the training program
- Supplying the mulberry cuttings
- Supplying the materials for farmers to cultivate land and build silkworm sheds.
- Supplying the early instar silkworms
- Receiving cocoons, drying and processing to the stage of marketing.

Farmers Role:

- Preparing their land, planting mulberry cuttings as the source of food for the silkworms
- Rearing silkworms to the stage of cocoon production, which will then be processed by the Banyumas Sutera Alam.
- Building silkworm sheds.

d. Silk Industry Project

This stage is the added-value production of Silk garments by use of the traditional methods of spinning and weaving, -thus encouraging the home industry. This stage can be done in the 3rd/4th year when the supply of cocoons is sufficiently stable.

5.3 Appraisal (financial and economic calculus)

In this chapter the investment analysis and financial plans for the farmers in three sizes of farm will be presented. Further on, sensitivity and critical points are calculated.

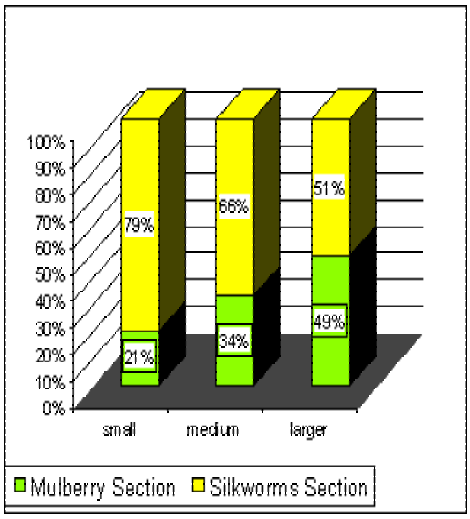
5.3.1 Terminology

The project is designed for ten years, started from 1998 and will be completed in 2008. Duration of each sericulture period cycle at the project is one month. The number of period's cycle in a year is ten periods.

5.3.2 Farmer point of view

a. Investments

Table 13 (page 48) shows the detail of investment by three size of farm. The small size of farm requires USD 400, medium size of farm USD 593.82 and larger size of farm USD 822.94. Proportion of mulberry section in the budget for small size of farm is at 21 percent, middle size of farm at 34 percent and larger size of farm at 49%, graphically detailed in figure 9.



The silkworm section shows higher proportion than that of mulberry sections, particularly by rearing-sheds and accessories (e.g. seriframe). Due to these investments, credits for smallholders are required.

Figure 9. Mulberry and silkworm section proportion in budget of sericulture investments.

Table 13. Investment of sericulture production for the farmers with three sizes of farm (USD)

No	Description	Unit	Price/unit	Small land		Middle land		Larger land	
				Qty	Total	Qty	Total	Qty	Total
A.	***Mulberry Section***								
I	**Leasing of land**	ha	47.06	0.30	14.12	0.50	23.53	1.00	47.06
II	**Labour :**						0.00		
II.1	Land preparation	mandays	0.59	60.00	35.29	100.00	58.82	200.00	117.65
II.2	Mulberry planting	mandays	0.59	9.00	5.29	15.00	8.82	30.00	17.65
II.3	Grass pruning	mandays	0.59	6.00	3.53	10.00	5.88	20.00	11.76
II.4	Fertilizer giving	mandays	0.59	6.00	3.53	10.00	5.88	20.00	11.76
III	**Fertilizer :**				0.00		0.00		
III.1	Organic fertilizer	kg	0.01	6,000.00	35.29	10,000.00	58.82	20,000.00	117.65
III.2	An organic fertilizer :						0.00		
	Urea (N)	kg	0.07	30.00	2.12	50.00	3.53	100.00	7.06
	TSP.	kg	0.11	15.00	1.59	25.00	2.65	50.00	5.29
	KCL	kg	0.11	15.00	1.59	25.00	2.65	50.00	5.29
IV	**Steck purchases**	pcs	0.00	6,000.00	17.65	10,000.00	29.41	20,000.00	58.82
	Sub total A				**120.00**		**200.00**		**400.00**
B.	***Silkworms Section***								
V	**Buildings Equipment :**	-	-					-	
V.1	Rearing shed for mature silkworm (small. medium. larger) *	pcs	176.47	1.00	176.47	1.00	235.29	1.00	235.29
V.2	Storage for material. mulberry leaves & cocoon	pcs	41.18	1.00	41.18	1.00	58.82	1.00	58.82
	(small. medium and larger) #								
VI	**Accessories and tools for silkworms cultivation**								
VI.1	Feeding boxes	pcs	5.88	1.00	5.88	1.00	5.88	2.00	11.76
VI.2	Wooden boxes for baby silkworms	pcs	1.76	2.00	3.53	4.00	7.06	8.00	14.12
VI.3	Plastic cocoon frame (1 set = 60 pcs)	set	58.82	0.50	29.41	1.00	58.82	1.00	58.82
VI.4	Wooden racks	m	0.88	10.00	8.82	15.00	13.24	30.00	26.47
VI.5	Basket for leaves	pcs	2.94	1.00	2.94	1.00	2.94	2.00	5.88
VI.6	knife. plastic filter. pail. thermometer.	ls	11.76	1.00	11.76	1.00	11.76	1.00	11.76
	hygrometer etc.								
	Sub total B				**280.00**		**393.82**		**422.94**
	Total Farm Capital (A+B)				**400.00**		**593.82**		**822.94**

Note:
* Price of rearing sheds: small size of farm = 176.47 USD; middle & larger size of farm = 235.29 USD
# Price of storage: small size of farm = 41.18 USD; medium & larger size of farm = 58.82 USD

b. Cash flow

Due to grow of mulberry, the leaves can be used for the feeding of worms up six months after they are planted, so that the first cocoons production in first year starts on seventh month. In the first year of cocoons production the small size of farm can cultivate only a quarter box of worm per period, middle size of farm a half box of worm, and larger size of farm 0.75 box of worm. Total of box in the first year small size of farm can cultivate 1.25 boxes of worms; middle size of farm cultivates 2.50 boxes of worms, and larger size of farm 3.75 boxes of worms.

These sum of worms box increase in the second, third year and reach in the forth year. Complete of mature worms requiring is presented in Appendix 2.

Assumed, that one box of worms can produce 25 kg fresh of cocoons, with the price of fresh cocoons 2.08 USD per kg in the first and second year, and 2.38 USD up third to tenth year, so that income in first year for the small size of farm: 1.25 boxes x 25 kg x USD 2.08 = USD 65; middle size of farm: 2.50 boxes x 25 kg x USD 2.08 = USD 130; larger size of farm: 3.75 boxes x 25 kg x USD 2.08 = USD 195.

Besides of fresh cocoons the farmers can sell mulberry branch as cuttings. Assumed, small size of farm can produce 10,000 pieces of cuttings; middle size of farm 15,000 pieces of cuttings and larger size of farm 20,000 pieces of cuttings. The price of cuttings was assumed USD 0.002 per pieces, so that small land has additional income in worth of USD 20, middle size of farm USD 30 and larger size of farm USD 40. Total of revenue for small size of farm = USD 85; middle size of farm USD 160 and larger size of farm USD 235. Complete of revenues are presented in Appendix 3.

In the first year cost for the small size of farm USD 39.12; middle size of farm USD 88.52 and larger size of farm USD 154.88. The majority of sericulture costs are labour costs (± 60 %) and rearing of silkworm (± 30%). The costs are detailed in Appendix 4 to 6.

c. Investment Analysis

Investment analysis used the data with the basis of costs and revenues from three sizes of farm. In the calculation was assumed reference interest 13 % p.a. and ten year for duration. Results showed that all of three sizes of farm are profitable. The internal of return (IRR) for small size of farm is at 48.42%, middle size of farm is 54.26% and larger size of farm is 72.70%. Net present worth (NPW) for small size of farm is USD 1,148.42, middle size of farm is USD 2,526.06 and larger size of farm is USD 3,534.86.

The values of Benefit Cost Ratio (BCR) for the three sizes of farm are more than 1.00. The complete of result is shown in table 14.

Table 14. Investment Analysis of sericulture production (USD)

Results	IRR	IRR-ref.int	NPW	BCR
Larger size of farm				
B.F.	72.70%	59.70%	3,534.86	1.49
Middle size of farm				
B.F.	54.26%	41.26%	2,526.06	1.58
Small size of farm				
B.F.	48.42%	35.42%	1,148.42	1.57

ref.int.	13%
lend interest long term	18%
lend. interest short term	18%

B.F. = Before Financing
IRR = Internal Rate of Return
ref.int. = Reference Interest
NPW = Net Present Worth
BCR = Benefit Cost Ratio

Year:	1	2	3	4	5	6	7	8	9	10
Inflow										
Larger size of farm										
Revenues	235	734	1,244	1,786	1,786	1,786	1,786	1,786	1,786	1,786
Residual Value										0
Middle size of farm										
Revenues	160	551	702	1,190	1,193	1,193	1,193	1,193	1,193	1,193
Residual Value										0
Small size of farm										
Revenues	85	367	420	595	595	595	595	595	595	595
Residual Value										0
Outflow										
Larger size of farm										
Investments	823						423			
Incr. Working Capital										
Operating Costs	155	470	723	1,161	1,161	1,161	1,161	1,161	1,161	1,161
Middle size of farm										
Investments	600						399			
Incr. Working Capital										
Operating Costs	89	293	361	738	738	738	738	738	738	738
Small size of farm										
Investments	404						283			
Incr. Working Capital										
Operating Costs	39	181	223	373	373	373	373	373	373	373
Net Benefits B.F.										
Larger size of farm	-743	-190	331	956	1,581	2,206	2,408	3,033	3,658	4,283
Middle size of farm	-528	-271	70	523	978	978	978	1,433	1,888	2,343
Small size of farm	-358	-172	24	246	469	691	630	853	1,075	1,298

Sensitivity analysis

Sensitivity analyses are carried out on two groups of variables: income variables and production costs variables. Six models are simulated with variation of values 20 % to 30%. Each model simulates a situation of sericulture production.

I. Frequency of production cycles per year : 7 periods

II. Fresh cocoon production per box : 20 kg

III. Total of grownup worm boxes

- Small size of farm : 0.75 box
- Middle size of farm: 1.5 boxes
- Larger size of farm : 2.25 boxes

IV. Price of fresh cocoons : 1.90 USD

V. Price of mature worm : 12.86 USD

VI. Hired labour per day : 1.19 USD

Model I, II and III represent the unfavourable of environments for sericulture production e.g.: long dry season, diseases of mulberry and silkworms etc. Model IV, V and VI represent the economically influence e.g.: increase of costs, and decrease of sell price of cocoons
Results are shown in table 15 to 17.

Small size farms

Table 15. Result of sensitivity analyses for small size farms

No	Model	IRR (%)	NPW(USD)	BCR
1	I	24.28	199.31	1.29
2	II	35.38	515.24	1.38
3	III	30.58	357.28	1.34
4	IV	16.65	347.98	1.31
5	V	45.25	1,013.91	1.51
6	VI	37.68	738.25	1.39

Middle size farms

Table 16. Result of sensitivity analyses for middle size farms

No	Model	IRR (%)	NPW(USD)	BCR
1	I	41.26	627.90	1.29
2	II	46.31	1,259.76	1.39
3	III	43.91	943.83	1.34
4	IV	28.99	951.90	1.31
5	V	51.44	2,257.10	1.52
6	VI	44.56	1,668.61	1.39

Larger size of farm

Table 17. Result of sensitivity analyses for larger size farms

No	Model	IRR (%)	NPW(USD)	BCR
1	I	54.34	687.54	1.21
2	II	61.90	1,635.33	1.31
3	III	58.40	1,161.43	1.26
4	IV	41.92	1,136.21	1.23
5	V	69.58	3,131.35	1.43
6	VI	61.30	2,192.85	1.31

The results (table 15, 16 and 17) showed that all of three sizes of farm still are profitable, even values 20 % to 30% changed.

The Frequency of production cycles per year (model I) is more sensitive than other variables, but such the value has changed from 10 to 7, 30% decreased, results were rentable.

The price of mature worm (model V) had the best results, even the price increased from 10.71 to 12.86 USD.

In compare between the unfavourable of environments variables (Model I, II and III) and economically influence variables (Model IV, V and VI), unfavourable of environments variables had more influenced to the profit.

Critically value

Table 18. Values minimum of key variables

Small Size of Farm

Key variables	value						
Periods per year	**4**	10.00	10.00	10.00	10.00	10.00	10.00
Box of silkworms/period (box)	1.00	**0.38**	1.00	1.00	1.00	1.00	1.00
Harvest /box (kg)	25.00	25.00	**9.61**	25.00	25.00	25.00	25.00
Price/box (Rp.)	USD 2.38	USD 2.38	USD 2.38	USD 1.33	USD 2.38	USD 2.38	USD 2.38
Costs (Rp):							
Grownup worms per box	USD 10.71	USD 10.71	USD 10.71	USD 10.71	**USD 39.98**	USD 10.71	USD 10.71
Labour per day	USD 0.89	USD 0.89	USD 0.89	USD 0.89	USD 0.89	USD 2.22	USD 0.89
Addtional cost (Training,-Visiting supervisors	USD 0.00	USD 0.00	USD 0.00	USD 0.00	USD 0.00	USD 0.00	USD 292.94
desinfection, etc) per year							

Middle Size of Farm

Key variables	value						
Periods per year	**4**	10.00	10.00	10.00	10.00	10.00	10.00
Box of silkworms/period (box)	2.00	**0.81**	2.00	2.00	2.00	2.00	2.00
Harvest /box (kg)	25.00	25.00	**10.12**	25.00	25.00	25.00	25.00
Price/box (Rp.)	USD 2.38	USD 2.38	USD 2.38	USD 1.34	USD 2.38	USD 2.38	USD 2.38
Costs (Rp):							
Grownup worms per box	USD 10.71	USD 10.71	USD 10.71	USD 10.71	**USD 39.02**	USD 10.71	USD 10.71
Labour per day	USD 0.89	USD 0.89	USD 0.89	USD 0.89	USD 0.89	USD 2.12	USD 0.89
Addtional cost (Training,-Visiting supervisors	USD 0.00	USD 0.00	USD 0.00	USD 0.00	USD 0.00	USD 0.00	USD 566.55
desinfection, etc) per year							

Larger Size of Farm

Key variables	value						
Periods per year	**5**	10	10	10	10	10	10
Box of silkworms/period (box)	3.00	**1.40**	3.00	3.00	3.00	3.00	3.00
Harvest /box (kg)	25.00	25.00	**11.64**	25.00	25.00	25.00	25.00
Price of fresh cocoon per kg	USD 2.38	USD 2.38	USD 2.38	USD 1.47	USD 2.38	USD 2.38	USD 2.38
Costs (Rp):							
Grownup worms per box	USD 10.71	USD 10.71	USD 10.71	USD 10.71	USD 36.13	USD 36.13	USD 36.13
Labour per day	USD 0.89	USD 0.89	USD 0.89	USD 0.89	USD 0.89	USD 1.95	USD 0.89
Addtional cost (Training,-Visiting supervisors	0.00	0.00	0.00	0.00	0.00	0.00	USD 762.29
desinfection, etc) per year							

5.3.3 Additional considerations ("packaging")

As shown in chapter 5 section 5.3.2, sericulture has an economic benefit. The availability of family labour (see Appendix 7: Population of Central Java) and conditions of climate (see Appendix 8: Rainfall, temperature and humidity) in the envisaged location of the project in Central of Java are suitable for this project.

The benefits of sericulture are presented in the following sections:

a. Rural production

Sericulture is a very promising prospective sector for rural economies. Sericulture is a highly labour intensive sector, employs a large number of labourers at various stages of its operation, does not require high-tech scientific skills or expertise, can be set up with small funds, and does not require full-time involvement (Halder, 1999). In China, this sector occupies some 20 million farmers, as well as 500,000 people in the silk processing industry. In India, sericulture is a cottage industry in 59,000 villages. As one of the most labour-intensive sectors, it provides full- and part time employment to some six million people (ITC, 1999).

In Indonesia 60% of the population (126 million) live in rural areas, of which a great majority are agriculture labourers (World Bank, 2002). Central Java, the third of high-density population province, has a 31 million population (BPS, 2000) and they mostly live in rural areas. Sericulture has a great potential for creating jobs and increasing income of the farmers.

b. Income generating, cash money possibility and long-term

The basic characteristics of traditional silk production areas are family units and sufficient land to grow the required amount of mulberries. According to the cost production at 70% of labour costs, sericulture can realize higher income for family units. In chapter 3 section 3.1, table 5, it is shown that sericulture increased income figures at 75%. The life cycle of silkworms is completed in 3-4 weeks, thus, possible harvest of fresh cocoons is monthly. In consequence, farmers can achieve cash money every month.

Since the mulberry is a perennial plant, once fields are established, they may be continuously cultivated with mulberries (Veda,1997). The farmers plant mulberry cuttings only at the beginning of their sericulture activities because sericulture is a long-term project.

c. Environmental aspects

Sericulture is associated with very few potential adverse impacts. Mulberry cultivation generally has beneficial environmental effects through soil conservation and provision of pruning reducing unsustainable harvesting of fuel wood (World Bank, 1997).

Silk has the advantage of being produced with few chemical fertilisers and practically no insecticides. Silk is user-friendly and environmentally friendly. Essentially composed of proteins, it is similar to human skin characteristics. It can absorb up to 30% of is own weight in moisture, making it extremely comfortable to wear (ITC, 1997).

d. Demand for silk products

Asia, Western Europe and North America are the major markets for silk products. In Asia the silk producing countries themselves are the major consumers. Asia utilises about 60% of the world's silk supply.

China and India have become major consumers, whilst Japan imported raw silk and cocoons in 2001 in amounts of USD 67.7 million. Korea is another major producer and consumer of silk products. Thailand also both produces and consumes significant amounts of silk. The demand for silk products is also high in other South Eastern Asia and Middle East countries. As the income increases in many of these developing countries the demand for silk will also increase (Henle, 1994).

Western Europe is one of the major silk demanding countries. Italy is the highest consumer of silk. The FAO (2002) reported that in the year 2001 Italy imported raw silk totalling 92.53 million USD, Germany an amount USD 21.75 million and France USD 11.26 million. The import quantity of raw silk is shown in Table 19.

Table 19. Raw silk imports to Europe from 1997 to 2001 (mt)

Year	Italy	France	Germany	Switzerland	Spain	United Kingdom
1997	5,482	582	2,889	236	377	499
1998	4,088	592	2,034	264	134	607
1999	4,985	579	2,210	283	200	223
2000	5,906	481	2,529	376	146	402
2001	4,506	452	1,598	170	263	332

Source: FAO (2002), Statistics

6 The Financial Proposals, Possibilities and Realization

6.1 Theory (before and after) and requirements

To commence a sericultural activity the farmers need a "kick start" capital. In chapter 4 it was shown that requirements of capital depend on the farm area. A small size farm needs USD 404, a middle size of farm needs about USD 600 and a larger size of farm needs USD 823.00. The need of financial support for sericulture investment can be reduced if the farmers themselves can supply parts of items in the investment, e.g. organic fertilizer, bamboos or woods for the racks and silkworm shed. Available family labour can be utilised to reduce about 20 percent of the budget. Mulberry cuttings could be supplied from the Banyumas Sutera Alam.

Table 20 shows the requirement of financial support for sericulture investments of farmer and his family undertook some of the work.

Table 20. The Requirements of financial support for sericulture investments after cost reducing by the farmers capital self (in USD)

No.	Description	Mulberry section	Silkworm section	Total
1	Small size of land (0,30 ha)	5.29	217.65	222.94
2	Middle size of landland (0,5 – 0,9 ha)	8.82	308.82	317.65
3	Larger size of land (1,0 – 3,0 ha)	76.47	311.76	388.24

Details of calculation can be seen in Appendix 4.1 to 6.2

Banyumas Sutera Alam, which as a Non Government Organization, has in this project the functions of coordinator, young worm producer and purchaser of fresh cocoons, needs financial support to realize the project.

Budget of financing from Banyumas Sutera Alam is shown in table 21.

Table 21. Budget of sericulture project BSA

No	Description	USD
1	Preparation	3,441
2	Construction	44,122
3	Office equipment, machinery, vehicles	65,102
4	Personal	99,285
5	Other operational expenses (transport, office)	8,248
6	Training	28,038
7	Fund for Farmer	66,090
8	Contingencies	15,214
	TOTAL	326,100

Source: BSA (1999), abridged

Explanations of expenses:

The construction part is including silkworm sheds for eggs–hatching room, for early instar silkworms and buildings for cocoon processing to silk clothes. The office equipment includes that necessary for silkworm rearing and for first cocoon processing equipments. Vehicles are required for transport of early instar silkworms to farmers, as well as motorbikes for farmers surveys. Training part is for costs of training 1000 farmers in house which means 3 days training and advanced training in fields. The Funds for farmer are for 500 farmers in the form of revolving funds.

Because the farmers' financial capacity is not sufficient, the farmers have to be provided with an adequate credit program. The credit programmes can be additionally provided from the following credit institutions: Government's Commercial Bank; Private Commercial Bank or NGO-International as funds.

6.2 Institutions and their conditions

The following credit institutions which have credit programmes especially for small farmers:

a. Bank Rakyat Indonesia (BRI)[8]

Bank Rakyat Indonesia (BRI) was established in Purwokerto, Central Java, by Raden Aria Wirjaatmadja, under the name of Hulp-en Spaarbank der Inlandsche Bestuurs Ambtenaren

[8] Source: http://www.bri.co.id

or the Bank Assistance and Savings of Indonesian Native Elites. Established in the 16th of December 1895 which later on was marked as the birth date of BRI.

Vision of BRI

To become a leading commercial bank which constantly place customers' satisfaction as priority.

- **Missions of BRI**

  To provide the best banking services with prioritized services to micro, small and medium enterprises in order to give support to the growth of the nation's economy.

- To provide prime services to the customers through nation-wide network of banking services and supported by professional human resources who implement good corporate governance practices.

- To provide optimized profit and benefits the stakeholders.

As a government's commercial bank BRI gives the credit for farmers, not only in sericulture activities. One of the programmes from BRI is General Rural Credits – Kredit Usaha Pedesaan (KUPEDES) which is distributed to almost all areas in Indonesia.

KUPEDES loans were introduced in February 1984. The instrument was designed to meet borrower's need as shown in field studies and through "Credit Mini" and "Midi". These studies and experiences consistently showed that prompt availability and convenience of the location are the most important criteria to the borrower. The level of interest rate charged is also important, but ranks below availability and convenience. This relative ranking has remained the same through the same repeated studies over the years.

KUPEDES is a general instrument, as opposed to target. Loans are given to individuals rather than to groups and can be given to support any ongoing creditworthy productivity activity. Loans are not available to start new ventures, because of the much higher credit risk in supplying venture capital. The flexibility of KUPEDES lending is important when surveyed the wide range of family activities (Field observations).

KUPEDES is a credit facility which is available in Unit BRI (not in BRI branches) to develop and support the eligible small-scale business.

The aim

The aim of KUPEDES is to extend small loans to individuals or enterprises considered eligible, and also members of a group or community with fixed incomes such as civil servants or state employees with a rank of II/D (not functionaries), employees of well-established

regional companies, pensioners on fixed incomes and others.

Different kinds of grants:

- Working capital loans by KUPEDES
- Fixed asset loans by KUPEDES

Sectors funded by KUPEDES:

- Agriculture
- Industry Sector
- Trade
- Services
- Fixed Income

Conditions and requirements:

The minimum amount of a loan by KUPEDES is Rp. 25,000 (about 3.00 USD and the maximum amount is Rp 50,000,000 (5,000 USD). There are two kinds of loans that can be given at the same time as long as the amount does not exceed the maximum amount of Rp. 55, 000,000. The minimum loan term period is one month and the maximum is 24 months, for working capital loans. Fixed asset KUPEDES loan terms may be up to a maximum of 36 months.

The instalment pattern:

- Monthly instalment
- Monthly instalment with grace period
- Instalment in 3, 4 or 6 month

Unique features of the KUPEDES loan product:

There is a PRI (IPTW; Prompt Repayment Incentive) for customers who regularly pay their loan instalments on time during a certain period. KUPEDES interest rates were set at a 1.5% flat per month for working capital and 1% for investment loans. The flat rates are calculated on the borrower's original balance and work out to annual effective rates of 33% and 22% respectively[9], if loans are paid on time. KUPEDES borrowers must provide sufficient collateral to cover the value of the loan, usually in the form of land titles, but also by the

---

[9]Based on a twelve month loan with monthly instalments of equal principal amounts according to the following formula [ix2xt/(n+1]x12, where i=monthly flat rate, t=loan term in months, n=number of monthly instalments.

pledging of buildings, motorcycles or other property. The maximum loan size has gradually been raised over the years from 1,000 USD at the start to 10,500 USD today.

b. Bank Danamon Indonesia (BDI)[10]

Bank Danamon was established in 1956 under the name of PT Bank Kopra Indonesia. In 1976, the Bank's name was changed into its current name PT Bank Danamon Indonesia. The Bank continued to expand and at November 5th 2002, became the first Indonesian private foreign exchange bank after obtaining its foreign exchange license from the Central Bank (Bank Indonesia).

Credit allocations to small enterprise and micro finance (UKMK) segment by Bank Danamon Indonesia are focused in financing personal or legal entities for productive businesses with priority in trade and manufacture, agricultural business and service sectors with credit allocation per debtor maximum Rp. 10 billion.

Vision

To be the nationwide bank of choice in the consumer and small-and-medium enterprise sectors.

Mission

To be a bank that delights its customers.

Credit Application Process

Applicant submits a credit proposal to the nearest Bank Danamon branch;

1. Complete data of the applicant are requested by the branch/marketing, data gathering;
2. The applicant completes all required data and documents (credit proposal);
3. Credit processing;
4. Credit proposal is handed over for approval to Credit Committee (credit decision);
5. A proposal letter is given to the applicant;
6. Realization (credit withdrawal);

Credit Acceptor Requirements and Criteria:

- Running a business at least for 2 years;
- Exposing a favourable cash flow;
- Not included in the business list disapproved by BDI;
- Not included in the black list in BDI;

---

[10] Source: http://www.danamon.co.id

- Complete and valid personal identity documents;
- Complete and valid legal business documents.

Facilities provided by BDI

In allocating credit to UKMK sectors, BDI provides several services to help applicants submit their credit application proposals to BDI (specially for small/ medium enterprises). The services are as follows:

1. Consultation on Credit Proposal;
2. Consultation on Management & Development of UKMK;
3. UKMK credit guarantee;
4. Credit insurance;
5. Information on UKMK website (via internet);
6. Assistance to UKMK segments.

Programs for Small Medium Enterprises Offered by Bank Danamon:

1. Kredit Kepada Koperasi Primer untuk Anggotanya (KKPA)

Objective

Investment loans & working capital provided by the bank to local cooperatives to be channelled to their members to fund a productive business.

General Requirements

For the agribusiness, trade and service industries.

Interest rate 16% pa (flat) including cooperative fee 2% pa.

Type of loan

1. Investment (max. 15 years)
2. Working Capital (max. 4 years)

Credit loan maximum Rp. 50 million per member & for trade cooperatives a maximum of Rp. 10 million per member.

Financing type: Executing & Chanelling

2. Kredit Kepada Pengusaha Kecil & Mikro (KKPM)

Objective

Provided for financing investment and/or working capital

General Requirements

For individuals, businesses or micro business organizations

Interest rate 16% pa.

Type of Credit

1. Investment (max. 5 years)
2. Working Capital (max. 1 year) extendable maximum 2 times

Credit loan maximum Rp. 25 million for investment & maximum Rp. 5 million for working capital, for both parallel maximum Rp. 30 million (for financing and working capital < investment)

Financing type: Executing

3. Kredit Ketahanan Pangan (KKP)

Objective

Provided for the investment and/or working capital for the farming, livestock & fishing industries

General Requirement.

For groups (Farmers, breeders, fishermen) or cooperatives

Interest rate 12 % pa. & 16 % pa. (depending on the type of business)

Type of Credit

Investment and/or working capital

Loan maximum Rp. 15 million for farmers, breeders, and fishermen & maximum Rp. 500 million for cooperatives to sponsor the harvest of rice, corn or soy´.

Financing type: Executing

c. Credits for Sericulture programs/Kredit Usaha Tani Perusteraan Alam (KUTPA)[11]

KUTPA is a credit facility from Government of Indonesia. Founded 1997 with a letter of legalisation number: 50/Kpts: II/1997 *Menteri Kehutanan* (Forestry of Minister) and continued with a legal of letter by *Direktur Jenderal Reboisasi dan Rehabilitasi Lahan* (General Directorate of Reforestation and Land Rehabilitation).

The aims of KUTPA are:

- To promote more prosperous life of people in surrounding forests;
- To develop sericulture to fulfil the necessity components of sericulture industry;
- To motivate farmers to cultivate silkworm and to enhance the environment quality.

KUTPA doesn't give credit directly to the farmers but to *Mitra Usaha* (company or industry) which is working together with farmers.
The requirements for *Mitra Usaha* to get the credit are:

- Have a legality;
- Have activity in sericulture;
- Have a legality cooperate with group of farmers, which get credits;
- Have access to market both of cocoons or silk products.

Budget of credit for silkworm farming is Rp. 4,356,000[12] (USD 518) for one hectare of mulberries, and that amount is for:

- Planting and cultivation mulberries;
- Building material and labor cost for shed of silkworm;
- Equipment for rearing silkworm;
- Labor cost for rearing silkworm.

The credit has an interest of 6% p.a, maximal for 5 years with a grace period of one year.

---

[11] Source : Departemen Kehutahan (Forestry Department) in Sutera Alam Indonesia (2000), page 284-287

[12] Exchange rates January 2004 : 1 USD = Rp.8,400.00

d. Catholic Relief Service (CRS)[13]

Catholic Relief Service, founded 1943, is the official overseas relief and development agency of the United States Conference of Catholic Bishops (USCCB), working in over 80 countries to alleviate poverty, hunger and suffering, with programmes that uphold the dignity of the human person and recognize that we are united into one human family. CRS supports the programmes and projects including health, agriculture, microfinance, education, human capacity development, humanitarian assistance in Africa, Asia, Eastern Europe and the Caucasus, Latin America and the Caribbean and the Middle East.

e. Misereor Germany[14]

Misereor was founded in 1958 as an agency "against hunger and disease in the world". In its capacity as the overseas development agency of the Catholic Church in Germany, it offers to cooperate in partnerships to promote development, fight worldwide poverty, liberate people from justice, exercise solidarity with the poor and persecuted, and help create "One World". On the basis of such partnerships, Misereor has succeeded since 1959 in promoting over 80,000 development projects which were planned and implemented under responsibility of national partners, the legal holders of the projects.

f. The Australian Agency for International Development (AusAID)[15]

The Australian Development Assistance Agency (ADAA) was established in 1974, bringing together functions performed by different departments since the aid program to Papua New Guinea began in 1946.

In 1976 ADAA was replaced by the Australian Development Assistance Bureau (ADAB) within the Foreign Affairs portfolio. In 1987 the name was changed to the Australian International Development Assistance Bureau (AIDAB), and in 1995 to AusAID, the Australian Agency for International Development. The head office is in Canberra and has representatives in 25 Australian diplomatic missions overseas, including Indonesia.
The Australian Government's overseas aid program is a Federal Government funded program that seeks to reduce poverty in developing countries.

---

[13] Taken from http://www.catholicrelief.org

[14] Taken from http://www.misereor.de

[15] Taken from http://www.ausaid.gov.au

The program uses a variety of delivery approaches. There are bilateral projects, also channel funds through United Nations agencies, International Financial Institutions (IFIs) and International Non-Government Organisations (INGOs). It also directly supports local Civil Society Organisations (CSOs) and other community groups. All activities require the Indonesian Government's endorsement.

g. **Department for International Development (DFID)- British Government**[16]

Department for International Development, founded 1997, is the British government department responsibility for promoting development and reduction of poverty.
DFID seeks to work in partnership with governments which are committed to the international targets and seeks to work with business, civil society and the research community to encourage progress which will help reduce poverty.

AS well as its headquarters in London and East Kilbride, DFID has offices in many countries. DFID works through staff based in British embassies and high commissions.

6.3 Practical realization

Most of credit providers have difficulty in the process of administration, higher interest of loan and need collateral. This is the problem which prevents small farmers from getting credits. To avoid this problem Banyumas Sutera Alam looked to International Non Government Organization – founder other for credits.

- Fortunately in 1998 to 2000 Banyumas Sutera Alam got support credits from Misereor, CRS, AusAID and DFID-British, both for the farmers and Banyumas Sutera Alam itself. For this funding Banyumas Sutera Alam has a duty to prepare the farmers for sericulture cultivations and provides revolving credits for the farmers.
  Farmers who want to know more about silkworm farming have to register to join training held by Banyumas Sutera Alam. Banyumas Sutera Alam held three day training for farmers. Materials, travelling costs and accommodation were provided free. The training sessions are provided once a month in the rainy season (six months in a year). In the trainings and the information is given on the following:
- Mulberries cultivation: land preparation, mulberries planting, pruning, fertilizer, etc.
- Silkworm rearing: hygiene in the rearing house, feeding methods, harvest of cocoons.

---

[16] Taken from http://www.dfid.uk

- Building a silkworm shed/ rearing house.
- Cash flow calculation.

Farmers who are interested in the silkworm farming will be surveyed by Banyumas Sutera Alam officers to give possibilities for sericulture on their cultivated land. The farmers can apply for credits from Banyumas Sutera Alam if land and labor are available for the sericulture activities.

The credit is given in a few steps. In the first month, farmers get credit for planting, cultivating the mulberries and organic fertilizer. After about six months, farmers get the next credit for building materials for the rearing house and equipment for rearing.

The amount of credit varies with the farmers. It depends on the farmer's application and the Banyumas Sutera Alam decision is based on the size of the farmer's land and his social economy.

Credit repayment for basic instalment and interest rate 7.5%, paid in four years, including two years of *grace period*. The credit repayment system is a direct repayment from their cocoons sale. The amount of credit repayment depends on the income of farmers from these cocoons sale, and agreement between farmer and Banyumas Sutera Alam.

The farmers in one district should have a group and choose one of them to be a leading sericultural farmer. The group has functions to coordinate the activities and communication between Banyumas Sutera Alam and the farmers. The groups should have meetings periodically to discuss the problems and find solutions for themselves first.

7 Implementation

The silkworm project is centred in Kaliori village, sub-district of Kalibagor in the district of Banyumas, Central Java province. The project is implemented by Banyumas Sutera Alam (BSA)/Yayasan Sosial Bina Sejahtera (YSBS) in collaboration with target group of 500 farming families in the target area (district of Banyumas), consisting of an estimate 500 men (husbands), 500 women (wives) and their children of productive age.

7.1 The target group – fiction or reality – stability and sustainability

The target farmers had originally been on subsistent farming, planting common crops such as corn, peanut and cassava. They sold the small surplus of their yields, but such crops did not give them enough income, particularly in time of hardship such as the economic crisis, as the market price of such crops were low and there were too many competitors. In 1997, they approached BSA/YSBS for advice on alternative crops that could provide them with more income. As Banyumas has a history for silk worm farming and the region is climatically suitable, the farmers were attracted to cultivating silk worms.
The project partner (BSA) and the local farmers started the experimental stage of silk worm farming in 1998. This experimental period lasted for 18 months, during which period the project has grown about 40,000 mulberry plants on two hectares of land, and the construction of silk worm shed to breed silk worm eggs. The cocoons harvests during this stage were approximately 30 kg of fresh cocoons per box.
Simultaneously, the project partner has also established market and technical assistance network with Indo Jado Sutera Pratama, Ltd. Co., a local silk thread factory. Indo Jado buys the silkworm cocoons produced by the farmers and provides technical assistance to the farmers to improve their skill in silkworm farming to enable them to produce better cocoons. Indo Jado has in fact sent some of its staff to the project site to train the farmers during this experimental period.

The next stage of the project was a Pilot Project. The overall goal of this three-year project was to improve the living standard of the target farmer families by enabling them to increase their income through silkworm farming. During this Pilot stage, the project was continuing in planting mulberry to another 10 hectares of land. More than 30 farmers have joined and reared silkworms in their sheds. The cocoons harvests during this stage were approximately between 25 to 30 kg fresh cocoons per box.

The Pilot Projects were conducted in 5 different districts. The project area is about 80 km^2 from the central project area. The distance of districts to the central project are for Banyumas 2 km, Purbalingga 20 km, Banjarnegara 30 km, Tegal 80 km and Pekalongan 80 km. The blue arrows show location of districts.

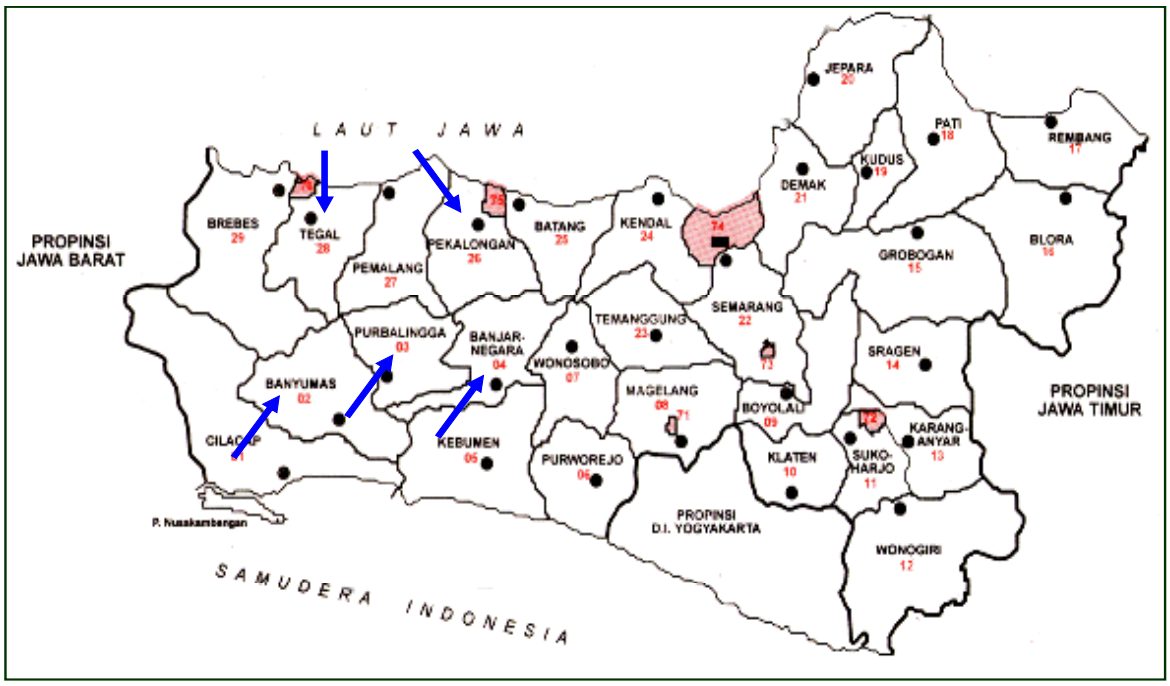


Figure 10. Locations of project

Source : Central Java Map

Since the Nucleus Project started in 2001, more than 200 farmers joined.

7.2 The managerial challenge versus the intellectual challenge

To manage the production the farmers in each district should have a group. The group itself, or BSA, chooses one of the farmers as a leader in the group. The function of a leader is to coordinate the activities and communications between BSA and the group. Groups also have meetings periodically to discuss the problems that they have in silkworm farming and find solutions. In this meetings BSA supervisors join and give information how to maintain the mulberry plants, handle upcoming diseases, maintain hygiene in a shed of worms etc.

BSA helps the farmers to schedule cultivation silkworm. This schedule should be the same for all farmers in one district. This is to make it easier to arrange the transportation early silkworms from BSA to the farmers and also the processing of cocoons by the firm (Banyumas Sutera Alam).

To order of young silkworms the leader collected from his group, how many boxes young silkworm are required. One box is approximately 20,000 worms and they are packed in 8 pieces of wooden boxes. In the first year, 1 ha can rear about 1 box. Middle size of farm (0.50-0.75 hectare) can rear 0.50 box worm and small size of farm (0.30 hectare) can only rear 0.25 box of silkworm.
The time schedule to order newly hatched is limited to the last 2 weeks before of date hatching, because Banyumas Sutera Alam has to order eggs from the government breeding station at least one week before date of hatching of eggs.
The early instars are transported to farmers in the morning or evening time. This is to reduce damage to silkworm quality through high temperature and sunlight. Banyumas Sutera Alam delivers the early instar silkworms to the leader of the group or one person in the group. Then they are delivered to the farmers who they have ordered them. The farmers rear the early instar silkworms by feeding them three times a day with fresh mulberry leaves.
The cocoons can be harvested in the next three weeks. Rearing the silkworms is done every month; with a target from one box of silkworms of around 25-30 kg of fresh cocoons.

Banyumas Sutera Alam buys fresh cocoons from farmers. The cocoon price is related to the basis on the classification of cocoon quality.
The price is dependent on quality of samples. This sampling method was decided between Banyumas Sutera Alam and the leaders of farmers. From all cocoons, farmer and Banyumas Sutera Alam officer selected the bad cocoons from the good ones. Bad cocoons are bought for Rp. 1500/kg (USD 0.18/kg). From all good cocoons will be taken 5 kg of cocoons randomly. Then from this, it will be taken 1 kg sample of best cocoons, then counted how many cocoons there are in that one kg. For example: 1 kg has 500 pieces of cocoons; then from these cocoons there are still 50 bad cocoons. So the ratio of broken cocoons is: 50/500 x 100% = 10 percent. To calculate silk content (skin of cocoon), another 50 cocoons are taken, their weight is then, e.g. 100 grams. The pupa are extracted and skin is weighted, e.g. of 20 (twenty) grams, so the skin of cocoons: 20/100 x 100% = 20 percent skin. The final price is 10 percent broken cocoons with 20 percent skin, which is Rp. 16,812 (USD 2) per kg.

Cocoons price is shown in Appendix 1. The value in the middle of table marked are the most common prices that farmer get for their cocoons.
The aim of price table for Banyumas Sutera Alam is to buy the fresh cocoons with good quantity and quality of silk content.
In the years 1999 to 2002 BSA has cultivated 40 silkworm periods. Period means a cycle of

silkworms from eggs to fresh cocoon harvest.

Some examples of cocoon production are shown in Table 22. Complete data of production from 1999 to 2002, can be seen in Annex 9 to 48.

Table 22. Data of cocoon production BSA's farmers in 7th period

Month	Nov-99		Sales						
ID	Land		fresh cocoons (good quality)			poor quality			Total
		NHS	Co	Price/kg	Total I	Co	Price/ kg	Total II	Sales (I+II)
	(Ha)	(Box)	(Kg)	(USD)	(Rp)	(Kg)	(USD)	(USD)	(USD)
4011	0.50	0.25	5.50	2.08	11.46	2.00	0.12	0.24	11.70
4012	0.50	0.25	6.00	1.79	10.71	2.50	0.12	0.30	11.01
4015	0.50	0.50	14.70	2.26	33.25	2.50	0.12	0.30	33.55
4017	0.50	0.50	15.50	1.79	27.68	1.50	0.12	0.18	27.86
4007	0.75	0.50	12.50	2.08	26.04	3.00	0.12	0.36	26.40
4001	1.00	0.75	17.50	2.26	39.58	2.00	0.12	0.24	39.82
4002	1.00	0.75	18.00	2.08	37.50	1.00	0.12	0.12	37.62
1026	3.00	2.00	48.00	2.26	108.57	3.00	0.12	0.36	108.93
Total	7.75	5.50	137.70		294.80	17.50		2.08	296.88

Source : Banyumas Sutera Alam (2000)
ID : Identity of Farmer
NHS : Newly Hatched Silkworm
Co : Cocoons

In comparison with the project plan the project had a different result Table 22 shows average production results from three farm sizes in years 1999 to 2002. The total times period for medium land is 2 (two), because the farmers in this group started silkworm rearing towards the end of 1999. Small land started silkworm rearing in 2000, so that the time period is 0 (zero) in 1999.

It is important to make that the production of cocoons was lower than planned.

The average harvest production per box in 1999 was 28 kg; in 2000 20 kg; in 2001 15 kg and in 2002 11 kg. Some reasons why the production sizes low are:

- Diseases of mulberries and silkworms.
- Lack of control from BSA supervisor

- Lack of labour and material: organic fertilizer, hygiene substance, etc.

Table 23. Data of average production of sericulture from three farm sizes from 1999 to 2002

No	Items	1999	2000	2001	2002	Average
A.	Larger size farm					
1	Periods per year	8	13	10	9	10
2	Box of silkworms/period (box)	1.27	0.90	0.65	0.82	0.91
3	Cocoons production/box	28.03	16.41	12.38	10.61	16.86
4	Price of fresh cocoon /kg (USD)	2.11	2.12	2.26	2.16	2.16
B.	Middle size farm					
1	Periods per year	2	13	10	9	8.5
2	Box of silkworms/period (box)	0.44	0.43	0.45	0.52	0.46
3	Cocoons production/box	27.15	19.97	13.60	9.38	17.52
4	Price of fresh cocoon /kg (USD)	2.06	2.10	2.30	2.20	2.17
C.	Small size farm					
1	Periods per year	0	7	10	7	8
2	Box of silkworms/period (box)	0.00	0.31	0.39	0.47	0.39
3	Cocoons production/box	0.00	21.13	14.29	13.57	16.30
4	Price of fresh cocoon /kg (USD))	0.00	2.19	2.33	2.16	2.20

Source: Banyumas Sutera Alam (2003), modified.

8 Monitoring

8.1 Selection of variables and parameters

Since the project has started in 1998 with experimental project until 2002 in the nucleus phase, the project was still on schedule. All these phases from experimental to industry phase have been completed. However, the project results were lower than expected.
By calculating a feasibility study in chapter four, the project expectations were as shown in table 24.

Table 24. Expected variables of silkworm project at BSA:

No.	Key variables	Larger size of farm		Middle size of farm		Small size of farm	
1	Periods per year	10	periods	10	periods	10	periods
2	Box of silkworms/period	3.00	box	2.00	box	1.00	box
3	Harvest of fresh cocoons /box	25.00	kg	25.00	kg	25.00	kg
4	Price of fresh cocoons /kg	2.35	USD	2.35	USD	2.35	USD

Source: calculation

With these conditions the project results for 10 years duration were:

Size of Farm	IRR	NPW	BCR
Larger size of farm	72.66%	3,530.90	1.49
Middle size of farm	54.23%	2,523.47	1.58
Small size of farm	48.38%	1,147.10	1.57

Further criticality values of the project have been calculated. These are shown in table 25.

Table 25. Criticality values of project expectations

No.	Key variables	Larger land		Middle land		Small land	
1	Periods per year	5	periods	4	periods	4	periods
2	Box of silkworms/period	1.40	box	0.81	box	0.38	box
3	Harvest of fresh cocoons /box	11.64	kg	10.12	kg	9.61	kg
4	Price of fresh cocoons /kg	1.47	USD	1.34	USD	1.33	USD

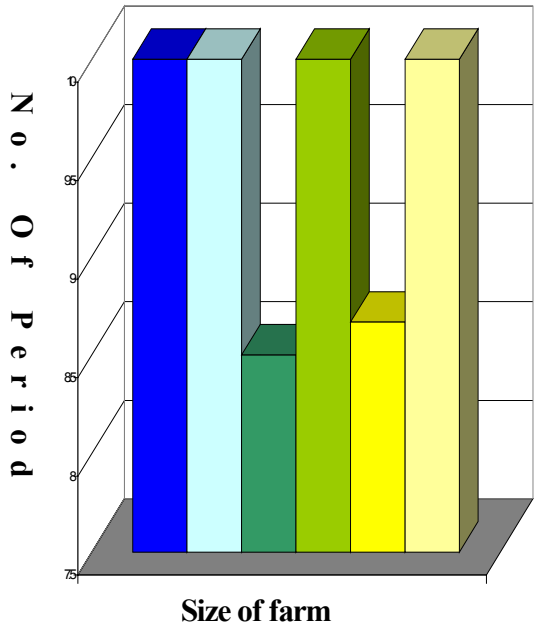
Source: calculation

Values in table 25 mean that the value is at minimum value with condition: if the others values of variables stay equal with expected values. As an example: In larger size the farms

value of periods per year is minimum 5 if the value of box of silkworm/period is equal 3 boxes; harvest of fresh cocoons/box equals 25 kg/box and price of fresh cocoons/kg = USD 2.35. In other words, if the other three values (or one of them) do not differ from expectations values, value of periods must be higher than 5.

In comparison to the value of expected variables (table 24) the values of project variables in reality were lower. Figure 11 shows the value of variables in reality compared with the value of variables in the expectations of the project.

1. **Time periods per year**

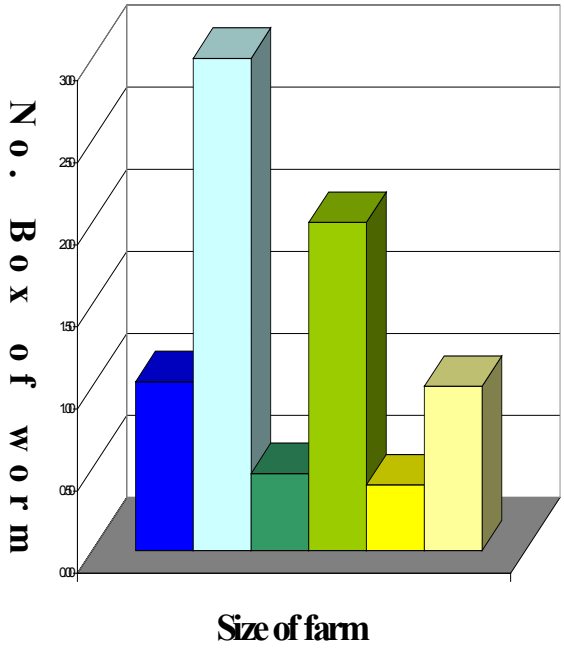


Value of time periods in reality by larger size of farm was same to value of expected: 10 time periods per year. In another one the middle- and small size of farm have lowers values than in expectations condition. Middle size of farm had 8.50; small size of farm had 8.67 time periods in year.

Figure 11. Comparison between reality values with expected values: variable: Periods per year

	EofL : Expected value of larger size of farm		RofL : Reality value of larger size of farm
	EofM : Expected value of middle size of farm		RofM: Reality value of middle size of farm
	EofS : Expected value of small size of farm		RofS : Reality value of small size of farm

2. Box of silkworms/ time period

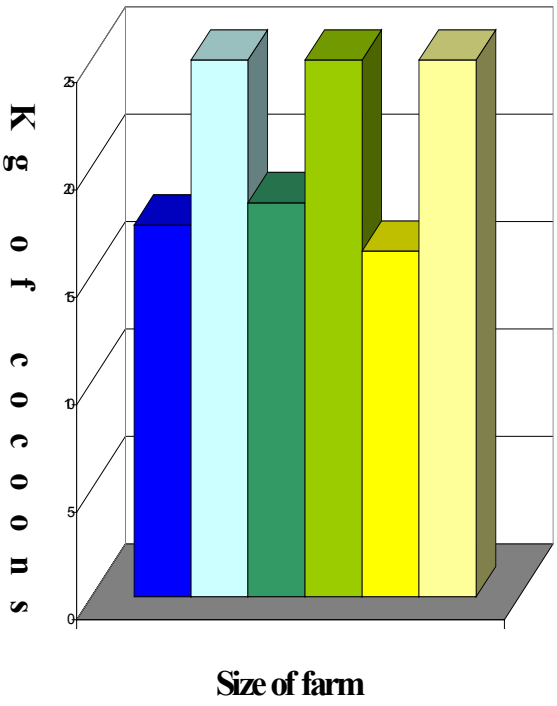


In reality by larger, middle and small size of farm were all values lower compared with in expectation condition. Larger size of farm had 1.03 boxes; middle size of farm had 0.47 box and small size of farm had 0.40 box per time period.

Figre 12. Comparison between reality values with expected values: variable: Box of silkworms/period

	EofL : Expected value of larger size of farm		RofL : Reality value of larger size of farm
	EofM : Expected value of middle size of farm		RofM: Reality value of middle size of farm
	EofS : Expected value of small size of farm		RofS : Reality value of small size of farm

3. Cocoon production/box

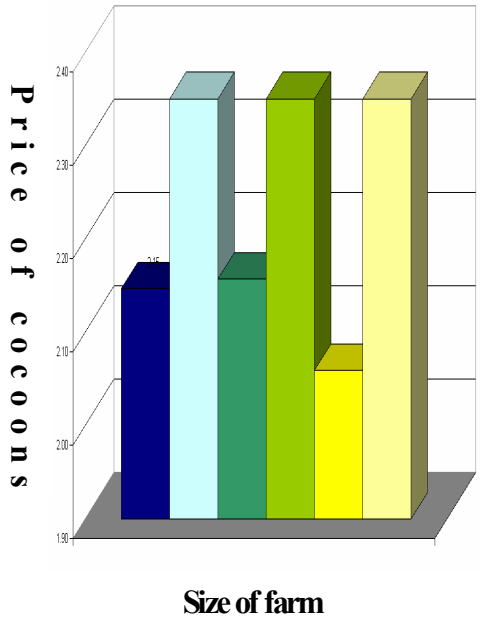


The cocoon production per box in reality by larger, middle and small size of farm were all values lower in comparison to in expectation condition (25 kg/box). Larger size of farm had production 17.32 kg/box; middle size of farm had 18.35 kg/ box and small size of farm had 16.1/box.

Figure 13. Comparison between reality values with expected values: variable: Cocoon production/box

	EofL : Expected value of larger size of farm		RofL : Reality value of larger size of farm
	EofM : Expected value of middle size of farm		RofM: Reality value of middle size of farm
	EofS : Expected value of small size of farm		RofS : Reality value of small size of farm

4. Price of fresh cocoons /kg



The price of fresh cocoons per kg in reality by larger size of farm 2.15 USD, middle size of farm 2.16 USD and small size of farm 2.06 USD. These all values were lower in compare with price of fresh cocoons (2.35 USD/kg) in expectation condition.

Figure 14. Comparison between reality values with expectation values: Price of fresh cocoons /kg

	EofL : Expected value of larger size of farm		RofL : Reality value of larger size of farm
	EofM : Expected value of middle size of farm		RofM: Reality value of middle size of farm
	EofS : Expected value of small size of farm		RofS : Reality value of small size of farm

To give both support to the implementation and programs of the project for the next years, and to give feedback into the design of new initiatives, some of variables in the mulberry section and the silkworm section have to be examined.

Mulberry section

Both quantity and quality of mulberry leaves are important as source of nutrition for silkworms. Quantity of mulberry leaves define how many boxes of silkworms and how many cycles could be reared in a year. As variables of quantity the mulberry leaves, have to be chosen as:

- Frequency of production cycle per year (periods p.a.), and
- Total of matured larvae of silkworm boxes per production cycle (box per cycle).

If the mulberry plants are well cultivated (pruned and fertilised regularly) therefore the mulberry plants are growing well, the frequency of production cycle per year could be high (10 times a year), and if the mulberry plants are growing well, leaves of mulberries are more available to feed silkworms, the total of matured larvae of silkworm boxes per production cycle could be also maximized (3 boxes/ hectare).

The variety of mulberry plants is a variable of quality. There are five different varieties of mulberry in this project. However, the farmers cultivate those which are the most popular varieties: *M. alba L(Ma), M. cathayana (Mc)* and *M. multicaulis (Mm).* The varieties of mulberry could present effects to quality of cocoons: total of weight cocoon, size of cocoon, percentage of shell etc.
If the mulberry leaves has high quality of food source available to the larvae, the cocoons will be also in high-quality.
These variables of quality and quantity influence the harvest and thus, the farmers' income. The income can be increased through improvement of quantity and quality of the mulberry plants (food source of silkworm larvae).

Silkworm section

Important results from this section are quantity and quality of cocoons. The quantity and quality of cocoons are influenced both from the mulberry plants and from the side of silkworm cultivation itself. There are a lot of variables that can be examined the out come, e.g. hygiene, condition of worm shed, disease control and feeding frequency etc. To examine these variables we chose only two important variables, namely:

- Fresh cocoon production per box (production of boxes in kg) and
- Price of fresh cocoons per kg (USD/kg).

The result of these variables is shown in table 26.

Table 26. Values of variables by the monitoring of project BSA from 40 periods (1998 – 2002)

No.	Variables	Larger size of farm		Medium size of farm		Small size of farm	
A.	Mulberry Section						
1	Frequency of production cycle per year	10	periods	8.5	periods	8	periods
2	Total of ground up silkworm boxes per production cycle	1.03	box	0.47	box	0.40	box
B.	Silkworm Section						
3	Fresh cocoons production per box	17.32	kg	18.35	kg	16.10	kg
4	Price of fresh cocoons per kg	2.15	USD	2.16	USD	2.06	USD

At the mulberry section, frequency of production cycle per year was, we expected. These values were higher than criticality values of the project (see table 24). On the other hand the total of advance silkworm boxes per production cycle had lower values than those that were designed. This result reflected that mulberry plants are growing still but they did not have many leaves for food. In other words the mulberry plants were not well cultivated. This could have been for reasons that as they were not fertilized or not sufficiently pruned, etc.

Because the mulberry plants were not growing well their leaves had poor quality and also were not sufficient to feed the worms. This condition evoked both lower values of fresh cocoons production per box and also lower values of cocoon quality. The decrease of cocoon quality can be characterised with the price of fresh cocoons that had been lower than the expected price at USD 2.35. Apart from mulberry leaves the lower price could be caused by the other factors: e.g. feeding frequency, hygiene of worm shed, diseases, etc.

To tackle above mentioned problems some additional management activities with additional costs of production are required, e.g. supplement of fertilizers, of hygiene and of management of diseases, repairing on rearing sheds to provide better environmental condition, etc.

8.2 Variance analyses and the practice of learning from doing

In order to develop a strategic plan and to increase the cocoon yield it is important to evaluate the effect of the food source that the larvae are eating and the optimum frequency of feeding.

Scientific Experiments

To establish the effects that mulberry varieties and feeding frequency have on cocoon yield, two experiments were undertaken. The aims of the experiments were:

- to establish the effect of the three mulberry varieties on cocoon yield and
- to evaluate the effects of the feeding frequency on the yield of fresh cocoons.

These results are important from the yield point of view but nevertheless, a cost benefit analysis of each procedure will determine the most profitable solution under the named circumstances.

Material and Methods

These experiments were undertaken at the silkworm project location at Banyumas Sutera Alam (BSA) in Central Java district in Indonesia during July to August 2003. Three treatments were used in these experiments were three different mulberry varieties, namely: *M. alba L* (Ma), *M. cathayana* (Mc) and *M. multicaulis* (Mm*)*. Also three different feeding frequencies were used namely e.g. larvae fed three times per day (P_1), larvae fed four times per day (P_2); and larvae fed five times a day (P_3). The experiment was replicated 2 times. Each treatment tray contained 200 silkworms. The data obtained from these experiments was analysed using 3 x 3 factorial SAS (version 8.2) GLM Analysis. Also to establish any differences between means a pair wise t-test was carried out. The data collected during these experiments were tabulated in the tables 27, 28 and 29.

Results

Table 27 shows the effect of different mulberry varieties and feeding frequency on the fresh cocoon yield. The analysed data presents that there were statistically significant effects on the fresh cocoon yield. The feeding frequency did not have any adverse effect on the larvae and there occurred no mortality in any of treatments. Feeding treatment and mulberry varieties both showed an overall effect on cocoon weight and shell (quality) of the cocoons.

These experiments showed that overall the cocoon weight and quality of the shell could be increased. The silkworm breeding personnel were paid on the weight and shell quality,

therefore there is scope to increase the income of the silkworm breeding personnel e.g. farmers, if the results of these experiments are adopted by the farmers.

Table 27. General effects of mulberry varieties and feeding frequency on the yield of fresh cocoons

	Number of cocoon (Nr)	Total of weight of cocoons(g)	Weight of 1 cocoon with pupae (g)	Weight of 1 cocoon without pupae (g)	Shell (%)
Varieties	0.4538	0.0098**	0.0122*	0.0104**	0.0165*
Feeding Frequency	0.7692	0.0002**	<0.0001**	0.0001**	0.0014**
Varieties x Feeding Frequency	0.3894	0.0077**	0.7183	0.5715	0.6206

Note: * Significant at 5 percent probability level.
* * Significant at 1 percent probability level

Effect of varieties of mulberry on the yield of fresh cocoons

The result of these experiments is shown in table 28.

Data collected from this experiment show interesting and significant differences among the mulberry varieties. From the three varieties of mulberry, *M. alba L* (Ma) gave a significantly ($p<0.05$) greater of the weight of the cocoons and quality of the shell. Ma showed higher total weight of cocoons and weight of 1 cocoon with pupae and without pupae compared to the Mc and Mm. Thus, the second best variety is Mm.

Table 28. Effect of varieties of mulberry on the yield of fresh cocoons

Varieties of mulberry	Number of cocoon (Nr)	Total of weight of cocoons(g)	Weight of 1 cocoon with pupae (g)	Weight of 1 cocoon without pupae (g)	Shell (%)
Ma	194.67	330.91[a]	1.7117[a]	0.3550[a]	20.73[a]
Mc	193.67	325.91[b]	1.6933[ab]	0.3367[b]	19.87[b]
Mm	195.33	327.61[b]	1.6733[b]	0.3400[b]	20.31[ab]
Pooled	0.90	0.89	0.0070	0.0035	0.17

In vertical columns, means followed by similar letters are not significantly different ($p<0.05$)

Effect of feeding frequency on the yield of fresh cocoons

The effect of the feeding frequency is shown in Table 29. According to the analytical results gained from this experiment it is obvious that feeding larvae five times a day (P_3) gave a significantly ($p<0.05$) on total weight of cocoons; weight of the cocoon with pupae and weight of the cocoons without pupae and increased quality of the shell of silk. The second best is feeding the larvae four times a day (P_2).

Table 29. Effect of feeding frequency on the yield of fresh cocoons

Feeding Frequency	Number of cocoon (Nr)	Total of weight cocoons(g)	Weight of 1 cocoon with pupae (g)	Weight of 1 cocoon without pupae (g)	Shell (%)
P1	194.83	323.22[a]	1.6500[a]	0.3233[a]	19.59[a]
P2	194.83	328.70[b]	1.7000[b]	0.3483[b]	20.49[b]
P3	194.00	332.50[c]	1.7283[c]	0.3600[c]	20.83[b]
Pooled	0.90	0.89	0.0070	0.0035	0.17

In vertical columns, means followed by similar letters are not significantly different ($p<0.05$)

In conclusion it can be seen that in these experiments *M. alba L*. gave the highest yield of cocoon weight compared to the *M. cathayana* and *M. multicaulis*. In order to increase the income of the farmer it is advisable that a survey is carried out in farmer's mulberry planting areas to establish the percentage of the *M. alba L.* compared to the other two varieties. Due to these results the farmers can adapt and increase the *M. alba L* plantings compared to the other

two varieties. This may lead to higher cocoon yield in weight and shell of good silk quality. However, other varieties should also be planted in 30% to 40% of the plantation area as a safety precaution in case *M. alba L*. fails for any reasons.

8.3 Organizational challenge

Besides variables of the mulberry- and silkworm sections, the other important factor that should be monitored is organisation of sericulture cultivate processes. For examples: education and training for the farmers; organisation of young worm transport, and management of farmers.

8.3.1 Education and training for the farmers

For the farmers sericulture was a new activity. Before, farmers did not have any knowledge of sericulture so at the first step they were trained in the Banyumas Sutera Alam project for three days. The training is continued if farmers are ready to cultivate silkworm (six month after planting of mulberry plants). This method is not sufficient for information transfer to farmers. The farmers need even more time to practise and cultivate in their own rearing shed. To give more success BSA supervisors help farmers cultivation for first time and show practise methods to the farmers in their own fields. It was also difficult because the number of participants (farmers) rose in comparison to the availability of supervisors.

8.3.2 Organisation of early instar of silkworm transportation

The distribution of young silkworm to the farmers should be done carefully and at the right time. The third instar silkworms which have to be distributed are in the phase of moulting to the 4^{th} instar. At the time when they finish their moulting, they should have fresh mulberry leaves for food. So the silkworms should be delivered at the right time and be fed immediately with fresh mulberry leaves. Some problems of distribution were that farmers were not ready to immediately pick up silkworms from the leader of their group or someone from Banyumas Sutera Alam who is delivering silkworms, because time of delivery was not fixed in exact hour unit. For one reason, the limitation of transport for delivery and long distance from one farmer to the other.

To solve these problems BSA tried to rear early instar of silkworms worms at the place of farmers. The leader or someone of the farmers will be trained how to rear early instar of silkworms. He rears them and distributes them to the single farmers. This method requires

time for training and new investments for the newly hatched silkworm sheds and the of equipment.

8.3.3 Management of sericulture activity of the farmers

The farmers in one location are gathered into single groups. The leader of one group helps the new farmers and discusses about their experiences and problems with the sericulture activity. The meeting schedule is organized by BSA so that the BSA supervisor could be attending that appointed meeting. These methods certainly are effective due to giving information by supervisors from BSA and are consulted for problems from the group with single questions. The meeting should be held at least every month. If the meetings are regular, the problems of managing diseases of mulberry cultivation and silkworm rearing can be detected early.

9 Evaluation

9.1 With respect to the plan and to development expectations

In the Monitoring Section was shown that the project results were not as good as expected. In order to develop the project for the further future expected values of variables (see table 24) should be still achieved. To reach these values, following activities should be done:

- Improvement of mulberry field: regularity of fertilizing and pruning, etc.
- Improvement of silkworm rearing: minimum feeding frequency is three times a day, using more Morus alba variety, better hygiene in rearing sheds, etc.
- Improvement of organization: early instar silkworm distribution, regularity in visiting farmers by supervisors, etc.

If these conditions can be reached, the project in the next five years (until 2008) will show results as follows below:

Size of Farm	IRR	NPW	BCR
Larger size of farm	6.70%	-771.39	1.25
Middle size of farm	44.58%	2640.61	1.55
Small size of farm	7.88%	-303.07	1.38

With the assumptions:

- Larger size farm:

25 kg fresh cocoons/box; 3 boxes/period; 10 periods/year; 2.35 USD/kg of fresh cocoons

- Middle size farm:

25 kg fresh cocoons/box; 2 boxes/period; 10 periods/year; 2.35 USD/kg of fresh cocoons

- Small size farm:

25 kg fresh cocoons/box; 1 boxes/period; 10 periods/year; 2.35 USD/kg of fresh cocoons

Reference of interest = 13 %, before financing.
(The complete of calculation is shown in appendix 49)

The project still has IRR higher than reference interest of the bank. The middle land has the best results than the other two sizes land, because middle land had better results in the last years project in comparison with the small and larger land.

To increase values of IRR and NPW, farmers should develop their income. The income can be increased with developing higher yields of fresh cocoons per box, both quantity and quality of cocoons. The income can not be increased within periods of silkworm rearing.

The expected value of period of rearing of silkworms per year was at maximum value: 10 time periods per year. So the expected value of fresh cocoons yield per box is 25 kg, as one possibility which can be developed. Theoretically, fresh cocoons yields can be increased to above 25 kg per box. One box eggs contains 25,000 eggs. They hatch and develop to become mature silkworms ready to spin cocoons. The weight of one fresh cocoon is about 1.5 to 2.0 g (see table 28). If mortality rate of worms is 25 percent so still 30 kg of fresh cocoons per box is feasible.

The other possibility to increase income is through quality. The market value of fresh cocoons is depending on percentage of broken cocoons and contents of silk. The sell price was expected with Rp.20,000 (equals USD 2.38) in condition 6 percent of broken cocoons and 23 percent contents of silk (see Appendix 1). It is possible to reach a higher market value if farmers rear silkworms with more intensively, e.g. more feeding, better hygiene in rearing sheds etc. But it is definitely more difficult to get a percentage of silk of more than 23 percent because contents of silk also depend on the breeding of silkworms. So farmers have more possibilities to increase the market value of cocoons through decreasing percentage of broken cocoons. Broken cocoons can be reduced if the silkworms, at the cocoon processing phase, are handled carefully, e.g. the only collection of silkworm that are ready for cocooning; using optimum seriframes for processing of cocoons.

To increase income through setting up the aspect of quality is rather difficult. But it could be more feasible for the next future that farmers reach better experience of sericulture rearing in future.

If yields of fresh cocoons can be achieved up to 30 kg per box, results of investment analysis for the next five years (until 2008) is as below:

Size of Farm	IRR	NPW	BCR
Larger size of farm	25.99%	2,156.52	1.45
Middle size of farm	55.84%	4,592.54	1.79
Small size of farm	21.68%	672.90	1.59

(Reference of interest = 13 %)

With results as such the investment of analysis is more profitable.

To develop the ongoing sericulture project at BSA there should also be improvement done through rearing assistance of sericulture at the farmers' side, and BSA as nucleus of the project, should be enhanced as well.

9.2 SWOT-Analysis

SWOT-Analysis is a systematic identification and a strategic decision making operation.

The aim of SWOT is to develop a plan that takes into consideration many different internal and external factors and maximizes the potential of the strengths and opportunities while seeking minimize the impact of the weaknesses and threats. (http://erc.msh.org/quality/ittools/itswot.cfm)

The internal variables are composed of variables such as: management, structural organization, production and operation, finance and human resources. Internal data is found from inside the company itself, e.g.:

- Financial report (balancing, cash-flow, cost benefit, and structural fee)
- Human Resources reports (total employees, education, skill, experience, salary, and turn-over).
- Operational Activity report
- Marketing Activity report.

External variables are outside of company control and the company has no power to control these external variables such as:

- Macro Variables

A macro variable is a large social power and can influence all in the micro industry such as: economic, politic and government, culture, demography, environment and technology.

- Micro Variables

Micro variables are those involved in the environment that have a first hand job in influencing the market industry, through costumer bargaining power, supplier bargaining power, new comers threat, competition between similar companies, and substantial product.

However, external data can be collected from outside company resources such as: market analysis, competitor analysis, community analysis, supplier analysis, government analysis, and other important community group analysis.

The logical base idea from SWOT is to maximize strength and opportunity, beside it seeks to minimize weakness and threats. In other words, SWOT-Analysis a situation analysis because Business Practitioners must analyses factors in company strategy (Strength, Weakness, Opportunity, and Threat).

Process of SWOT Analysis

SWOT-Analysis strategy considers four conditions:

1.Strength & Opportunity (internal)
2.Opportunity & Weakness (external vs. internal)
3.Strength & Threat (internal vs. external)
4.Weakness & Threat (external)

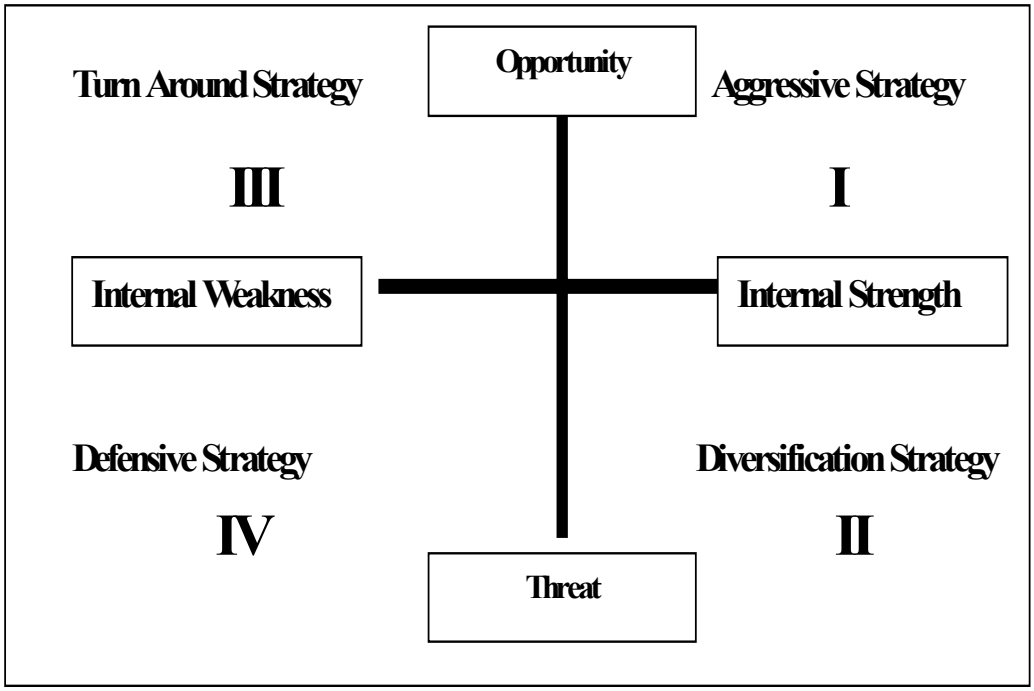


Figure 15. SWOT Analysis

Explanation :

Quadrant I

Company is in the current situation. The company has opportunities and strengths that can be used. Growth oriented strategy should be applied in this condition.

Quadrant II

Although facing some threats the company still has internal strengths. Diversification strategy (product or market) should be applied because the company has internal strengths that can be used on long period opportunities.

Quadrant III

The company is facing a great market opportunity, but on the other hand they also face some internal weaknesses. A business condition in Quadrant III is similar with a question mark in the BCG-Matrix. They must focus to minimize internal company problems in order to reach market opportunities.

Quadrant IV

The company is in a poor condition because they face some threats and deal with internal weaknesses.

SWOT-Analysis of BSA

The SWOT-Analysis of BSA was conducted in 2003. The data were collected from several activities: interviews with farmers and project staff, utilization of available reports, etc. The aim of this SWOT-Analysis for BSA is to develop a future plan that takes into consideration many different internal and external factors, and maximizes the potential of the strengths and opportunities while minimizing the impact of the weaknesses and threats from BSA itself. With this analysis and improvement of sericulture in the farmers, the project sericulture at BSA can be developed for the future.

The result of SWOT-Analysis of BSA is presented in table 30

Table 30. BSA SWOT-Matrix

	Strengths	Weakness
INTERNAL	• Gets support from society. • Family labor is available. • Availability of foreign investment capital. • Existence of cooperation with other institutions from within the country as well as from abroad. • Existence of program training to develop employees'skills. • Complete of machine processing and high capacity. • Hand made silk products	• Fluctuation of silkworm quality. • Irrigation not possible at farmers' side. • Cocoon volume production is still lower. • Limited of fund. • Availability of expertise in marketing are still low.
	Opportunities	**Threats**
EXTERNAL	• Interest of farmers to sericulture is high. • Improving of silkworm eggs through government research or university. • Existence of training offers from local government and all donors. • Available market for selling fresh cocoons. • The opening of show room of cloth sutra in trade centre. • Artless silk cloth development become the home made batik silk cloth.	• Farmer knowledge is low. • Monopoly of silk eggs production from government. • Cheaper cocoons from other countries. • The lower price of synthetic silk-like fabrics. • The image, forming of society's opinion about product and level of silk softness.

Strengths

- *Get the support from society*

Although BSA is a relatively young NGO, nevertheless, the program of sericulture has involved a lot of farmers and women workers at cocoon processing. With this support it is still possible for BSA to develop furtheron sericultural area in the future.

- *Family labour available*

The most of farmers has a family with 2 to 4 children. Therefore, family labour at the farmer level is available.

- *Existence of cooperation with national and foreign institution.*

BSA has good cooperatives with Universities, Research Institutions and local Government in Central Java. Furthermore BSA also has good cooperatives with international NGOs: AusAID, CRS, DFID-British Embassy, Misereor-Germany, etc. This cooperation provides chances for BSA to get support in technologies (through training, seminars, etc) and financing for developing of the project.

- *Facility of sericulture processing*

BSA has the complete machinery for silk processing. These machines have high capacity. BSA can buy cocoons from the farmers with high capacity.

- *Hand made of silk products*

The silk clothes are made with traditional machine (ATBM = Alat Tenun Bukan Mesin). These clothes are exclusive and of high value.

Weakness

- *Fluctuation of silkworm quality*

The silkworms have fluctuation of quality. These are caused by quality of eggs, newly hatched silkworm rearing, distribution of silkworms - so that the production of cocoon can be influenced. The cocoons production are lower.

- *Irrigation not possible at the farmers*

Most of the farmers do not have irrigation on their land. They can not rear silkworm in dry season, especially in time from August to September, because mulberry leaves are not available.

- *Limited of fund*

Ability of investment fund is very limited so that require long time to extend business.

- *Limited of marketing experts*

Availability of expertise in marketing are still few. Increasing of the product's volume could present difficulties at product marketing.

Opportunities

- *Interest of farmers to sericulture still high*

It is still possible to expand the project to the farmers. Most of farmers want to join the project. It can be seen if Banyumas Sutera Alam offers the training, the number of participants will be high.

- *Improving of silkworm eggs through government research or university*

Government research institutions and Universities are doing research in sericulture every year. Banyumas Sutera Alam can provide information; know how; eggs from these researches.

- *Existence of training offer from local government and all donor*

BSA has training offers from all donors and government each year. This could give chances for BSA to improve its capability.

- *Market of fresh cocoons and silk products*

The market is still open with high capacity, especially for cocoons. So that BSA has still chance to market cocoons.

Threats

- *Farmer knowledge is low*

Because target group are small farmer in rural region the farmers are not well educated. BSA should give information through more practice and activity. The transfer of know how needs more time and patience than in cases of educated people.

- *Monopoly of silk eggs production*

The government has the monopoly of the egg production. Hence, it is difficult to get eggs from another source.

- *Cheaper cocoons from another country*

The world market price of cocoons is lower than Banyumas Sutera Alam, especially those from China. Therefore Banyumas Sutera Alam can market their cocoons if the price is lower or equal with the current price.

- *The lower price of synthetic silk like fabrics.*

The price of synthetic fabrics that are silk-like is cheaper than pure silk. It is difficult to compete with the synthetically produced fabrics.

- *The forming of society opinion about story; level of silk softness (synthetic silk)*

Most people know that silk means brightness, very soft texture and cheap product. The image of synthetic silk is stronger than pure silk. So that people want to buy only synthetic silk which fulfils their expectations as mentioned above.

Based on the aspects resulting from the SWOT-Analysis a TOWS-matrix was developed. A combination of several external factors (threats and opportunities) and internal factors (weaknesses and strengths) lead to the composition of certain strategy-elements. These are classified in short- (combination of strengths and opportunities), middle- (combination of strengths and threats as well as weaknesses and chances), and long-term (combination of threats and weaknesses) elements. The TOWS-Matrix is presented in table 31.

These elements of strategy were combined to three complete strategies:

1. The strategy for breeding of eggs;
2. The strategy for sericulture cultivation at the farmers;
3. The strategy for marketing.

Table 31. BSA TOWS-Matrix

	Strengths	Weakness
	SO - Alternatives	**WO - Alternatives**
INTERNAL	• Improvement of employees' skills by training by the government. • Improvement of better sericulture activities with a farming example. • Invent innovations by applying silkworm techniques. • Conservancy quality product and quality service to form the positive image of company. • Make silk material to become silk textile. • Cooperate with the government institution or school for making batik uniforms. • Expand market compartment to improve marketing.	• Improvement of breeding eggs through government- and universities research. • Optimizing the volume of production by increasing employees' skills. • Utilizing the training programmes to produce expertise. • Increasing the farmers' awareness for the importance of silkworm farm operations. • Improvement of marketing promotion effectively and efficiently.
	ST - Alternatives	**WT - Alternatives**
EXTERNAL	• Establishment of breeding research with institutions and founders. • Skills improvement of farmers from a training program which is held by BSA. • Maintaining quality product to face the competitor. • Increasing the cocoon volume production. • Determination of market goals (sales position outside the area of product sale of non-pure silk). • Socialization of pure silk product. • Existence made in non-machine weaving tools (ATBM).	• Provide other sources of silkworm eggs • Forming of groups of sericultural farmers to assist to increase the farmers' ability. • Study comparison and -cooperation with other institutions. • Recruit expertise in marketing areas to increase the company's performance. • Propose long term loan for the expansion of the effort.

The strategy for breeding of eggs

The problem of the eggs' quality can be handled with following strategies:

SO- Strategy: -Invent innovations by applying silkworm techniques.

WO- Strategy: -Seek and apply new egg strains with a better quality through government and Universities research

ST- Strategy: -Establishment of breeding research with institutions and founders.

WT- Strategy: -Providing with other sources of silkworm eggs

The strategy for sericulture cultivation at the farmers

SO-Strategy: -Improvement of better sericulture activities with farming sample

WO-Strategy: -Utilizing the training program to produce expertise

-Increase the farmers' awareness for the importance of silkworm farm operations.

ST-Strategy: -Skills improvement of farmers through a training program which is held by BSA.

WT-Strategy: -Forming of groups of silk farmers to assist the increase the farmers' ability.

-Study comparison and cooperation with other institutions.

-Propose of long-term loan for the expansion of the effort.

The strategy for marketing.

SO-Strategy: -Conservancy quality product and quality service to form the positive image for company.

-Make silk material to become silk textile.

-Cooperation with government institution or school for making of batik uniforms.

-Expand market compartment to improve marketing.

WO-Strategy: -Optimizing the production volume by increasing employees' skills.

-Improve marketing promotion effectively and efficiently.

ST-Strategy: -Maintaining quality product to face the competitor.

	-Increasing the cocoon production volume.
	-Determination of market goals (sale position outside area of product sale of non-pure silk).
	-Socialization of pure silk product
	-Existence made in non-machine-weaving-tools (ATBM).
WT-Strategy	-Recruit expertise in marketing area to increase the company's performance

9.3 With respect to the theorem of project cycle analysis

To develop the ongoing project at Banyumas Sutera Alam for the future some of the plans should be revised. Three categories of main problems should be worked out, namely:

1. *Breeding of silkworms.*

Breeding of silkworms needs research and laboratory facilities. Banyumas Sutera Alam can not reach these without the support from other institutions. Banyumas Sutera Alam should work together with them. The research of silkworm breeding needs a long time but Banyumas Sutera Alam's farmers have an immediate need of higher quality of silkworms. To give this solution besides the researches are done, Banyumas Sutera Alam should request a permit to import silkworm eggs from abroad. Many countries like Japan, China and South Korea have good strains of silkworms and these are sold as commercially. Banyumas Sutera Alam can import and try those at the project location. To avoid dependence for egg supply from Government Banyumas Sutera Alam should provide research as well. The costs of eggs should be calculated according to demand, for they could be higher than before. For the short time Banyumas Sutera Alam can give subsidy to the farmers. Subsidy could be removed if future yields of fresh cocoons are higher than before.

2. *Cultivation of silkworms at farmer's field.*

The rearing of sericulture at farmers sheds should be developed. The farmers should be trained and kept up to date. The framer groups should meet regularly. The small area Pilot Project should be provided and optimum cultivated. This could serve also as a small training centre for the farmers. The newly hatched silkworms should be reared directly at farmers

rearing sheds. The leader of the farmer group can organize the rearing and distribution of newly hatched silkworms.

3. *Marketing.*

Banyumas Sutera Alam can market silk products as silk clothes, silk yarn and cocoons. The market for clothes is smaller than silk yarn or cocoons but the profit of clothes is higher. Banyumas Sutera Alam should offer and get a contract for the marketing of silk clothes to government- and private institutions, e.g. as uniforms. Silk yarn and cocoons could be sold easier because the market is open. The problem is the price of cocoons that is higher at Banyumas Sutera Alam project than local market price. Banyumas Sutera Alam can redefine the price of cocoons from the farmers. The criticality of expectation values of the project (see table 25) show that the limit of cocoon price is USD 1.65. The current market price is USD 2.00, so that Banyumas Sutera Alam can buy within this price level.

No matter how well a project has been identified, prepared and appraised, its objectives can only be realised when it has been properly executed. All projects face implementation problems, some of which cannot be foreseen. Adequate supervision is therefore of high priority. The project, a detailed implementation plan/schedule should be prepared again. This plan outlines actions to be taken by the respective parties responsible for the next implementation. This plan should be prepared in sufficient detail to ensure that the project is implemented more efficiently.

Monitoring and Evaluation should be reported again. Results and recommendations drawn from these reports are to be fed back into the design and implementation for future, so the project will be further developed. The project cycle starts again and continues.

10 Discussion, Conclusions for the Sericulture Project in Central Java, for the Project Cycle Approach

EuropeAid (2001) described, the Project cycle as the way in which projects are planned and carried out in a sequence beginning with an agreed strategy, which leads to an idea for a specific action, which then is formulated, implemented, and evaluated with a view to improving the strategy and further action. The sericulture project in Banyumas Sutera Alam, Central Java was conducted in this way.

The idea of the sericulture project in Central Java 1997-1998 was introduced to the farmers in the circumstances, which Indonesia was in the situation of economic crisis. At the time, the costs of living increased and prices of materials for agricultural cultivation, e.g. seed, organic fertilizers, pesticides etc, were more expensive than before. Farmers could not afford to purchase these items so there was not agricultural activity.

Sericulture is labour intensive, but there are not many requirements of agricultural substance. Mulberry seeds are produced from branches of other mulberry plant/cuttings (vegetative methods). Sericulture requires organic fertilizers, but no pesticides, and no herbicides. Continual use of non organic fertilizer can reduce mulberry leaves (Samsijah & Kusumaputra, 1982).
Because income generation was an aim of the project many farmers have joined in this project.

Banyumas Sutera Alam, a Non Government Organization, organized this project. As the nucleus organisation, Banyumas Sutera Alam rear newly hatched silkworms, delivers them and buys the cocoons from farmers. Sinha (1994) explained that NGOs are often concerned with identifying, testing, adapting and disseminating locally appropriate technology.
In 1998 BSA conducted an experimental project and continued with a pilot project. The project was implemented as a nucleus project for the farmers in five districts. In 2001 a firm of cocoons processing was built earlier than was scheduled.

Gregory et al. (1994) argued that one strong point of the NGOs is their greater proximity to the people and therefore, their ability to carry forward the welfare programmes faster, suiting to the need and cultural context of the people.

Unfortunately the production of project was under unexpected from 1999 to 2002. The harvest of cocoons per box was only around 18 kg. It was only ± 70 percentage of target 25

kg. Farmers cultivated only 1.03 boxes /period for larger size farm, 0.47 for medium size farm and 0.40 for small size farm. In comparison with expected plans these were 60 to 70 percent lower than the target.
The project evaluation (chapter nine) showed that the there is three categories of main problems, which are the breeding of silkworms, rearing of silkworms by the farmers and marketing of silk products. These problems need to be solved.

Veda, K., et.al (1997) explained that the **breeding of silkworms** is an important stage of sericulture, because it influences to quality of silkworms.
If the eggs hatch uniformly, newly hatched silkworms could grow in uniformly, and mature silkworms do too. The farmers can get cocoon to the yields stage easier and more homogeny. Long term programs for the breeding of silkworms at Banyumas Sutera Alam can be improved through collaboration of research with government research institutions and universities. For the short term programs, Banyumas Sutera Alam should look for silkworm eggs from a domestic source or in a foreign country.

Rearing of silkworms by the farmers can be influenced from multiple variables, e.g. mulberry leaves, rearing shed, climate, and the farmers themselves, etc (Lim, et.al., 1990). Besides improving the environment for sericulture cultivation, the most important thing is to improve the farmer's human capital. It can be improved through training and the extensions service of Banyumas Sutera Alam.

Extension services are an important element within the array of market and non-market entities and agents that provide human capital-enhancing inputs, as well as flows of information that can improve farmers` and other rural peoples` welfare; an importance long recognized in development dialogue (e.g., Leonard, 1977; Garforth, 1982; Hazell and Anderson, 1984; Jarrett, 1985; Feder, Just and Zilberman, 1986;Roberts, 1989 in Anderson and Feder, 2003).

BSA should give more training and practical assistance to the farmers. The farmer's groups should be active. Controlling of farmers should be intensive. Effective extension involves adequate and timely access by farmers to relevant advice.

Marketing of products is important for sustainable of the project. Banyumas Sutera Alam can produce dried cocoons, raw silk, thrown silk and traditional silk cloth. The market for traditional silk clothes is small and limited. Banyumas Sutera Alam should be able to sell more silk products in forms of dried cocoons or silk yarn. The problem is price of fresh

cocoons at the project too high and cost of production for silk yarn processing is higher. Through improving worm breeding and silkworm cultivation by the farmers, theoretically, the harvest of cocoons can be increased. The farmers can get more quantity of cocoons per box, so that Banyumas Sutera Alam could handle the cocoons for the farmers to find out the best price for both the farmers and Banyumas Sutera Alam. The production cost of silk yarn processing, automatically decreases, if the capacity is higher through increasing of cocoon harvest by the farmers.

Wund (1996) argued that there are three of kind cooperatives in the sericulture industry:

- **Horizontal cooperatives** e.g. farmers to farmers; institution to institution and silk processing firm to silk processing firm, etc.
- **Vertical cooperatives** e.g. farmers to government institution; silk processing firm to buyer, etc.
- **Diagonal cooperatives** e.g. Farmers to silk processing firm, silk processing firm to government institution.

Generally, the development of the sericulture project at Banyumas Sutera Alam can be improved through cooperation between the farmers with farmers (horizontal cooperate), farmers with Banyumas Sutera Alam-Non Government Organization (vertical cooperate) and Banyumas Sutera Alam, as silk industry with research institution (diagonal cooperate).

Limitations

Even when the above strategies are carried out, this cannot alone guarantee successful results. Many other factors will also influence a project's success. The successes of a project are influenced by a number of factors e.g. good/ careful planning; efficient project management; competent and motivated project team etc (EuropeAid, 2001).

Sericulture is it self influenced by multi variables e.g. climate, mulberry cultivation, silkworm cultivation, and farmers, etc. The above strategies are only one of many strategies for improving sericulture.

Further research

There has been no evaluation of sericulture technically or for the social situations in this study. Further study in these terms of works could provide for the analysis of the project.

It is also suggested that further study based on the development planning and project cycle analysis in this area in the future could provide greater enlightenment for the success of these projects.

BIBLIOGRAPHY

ANDERSON, J.R. and FEDER, G. (2003): "Agricultural Extention : Good Intentions and Hard Realities". World Bank, Washington, DC.

ANONYMOUS (2003): "History of Silk". http://iqproducts.8m.com/history.

ATMOSOEDARJO, S., KARTASUBRATA, J., KAOMINI, M., SALEH, W.,and MOERDOKO, W. (2000): "Sutera Alam Indonesia". Jakarta, Indonesia.

BADAN PUSAT STATISTIK (BPS) (2003): "Statistik Indonesia". http://www.bps.go.id

BANYUMAS SUTERA ALAM (1998):"Proposal Sericulture Project in Kaliori". Banyumas, Central Java, Indonesia.

BLAIR,G.M. (2003): "Planning a Project." http://www.see.ed.ac.uk/~gerard/Management/art8.html

CHAMBERS, ROBERT (1983): "Rural Development : Putting the Last First". Logman Group Limited. England, United States of America.

CENTER FOR INSECT SCIENCE EDUCATION OUTREACH (CISEO) (1997): "Silkworm Information". The University of Arizona. http://insected.arizona.edu/silkinfo.htm

DEPARTEMENT OF FORESTRY (2001): "Data on Indonesian Sericulture". Jakarta, Indonesia.

DEPARTEMENT FOR INTERNATIONAL DEVELOPMENT (DFID) (2000): "Indonesia: Country Strategy Paper". http://www.dfid.uk

FAO (1994): "Managing income-generating rural activities - Village group training". Rome, Italy.

FAO (1999): "Silk reeling and testing manual". http://www.fao.org.

FAO (2001): "Summary Report - FAO/RAP Rural Development Support to Disabled Farmers in CAMPAIGN 2000". http://www.fao.org..

FAO (2003): " Statistic Data". http://www.fao.org..

FEDER, G., JUST, R.E. and Zilberman, D. (1986): "Adoption of Agricultural Innovations in Developing Contries: A Survey". Economic Development and Cultural Change 35(1), 255-98.

FinAID (2003): “Net Present Value”. http://www.finaid.org/loans/npv.phzml.

GARFORTH, C. (1982): “Reaching the Rural Poor: A Review of Extension Strategies and Methods” in G.E. Jones and M.J. Rolls, (eds.), Progress in Rural Extension and Community Development, Vol. 1, Wiley, New York, pp. 43-69.

GEERTZ, H. (1961): “The Javanese family : a study of kinship and socialization”. New York .Free Press of Glencoe. XII, 176.p

GITTINGER, P. J. (1994): “Economic Analysis of Agricultural Projects” Baltimore [u. a.]: Johns Hopkins University Press. XXI, 505 p. ISBN: 0-8018-2912-7. - ISBN: 0-8018-2913-5. (Edi Series in Economic Development)

GREGORY, S., PARTHASARATHY, V.S. and AURORA, G.S. (1994):” NGOs, Sericulture and Development”. Paper in International Conference on Sericuture. Banglore. India

HAZELL, P. (2001): “Agricultural research and poverty reduction”. Washington, DC : IFPRI, VI, 41 S. ISBN: 0-89629-639-3. (Food, agriculture and the environment discussion paper; *34*)

HEMMER, H-R (2002): “Wirtschaftsprobleme der Entwicklungsländer “. München .Vahlen, XXVIII, 1118 S. ISBN: 3-8006-2836-8. (Vahlens Handbücher der Wirtschafts- und Sozialwissenschaften)

HENNY (2002):”Structure and Performance of Credit Programs in Sericulture Development- a Case Study from Java, Indonesia”. Master Thesis. Humboldt University of Berlin. Germany

HEGDE, N.G., and SOHANI,G.G. (1994): “Role of NGOs in Sericulture Development”. Paper on International Conference on Sericulture, India

HENLE, H.V. (1994): “Growth in Production and Demand of Silk “. Paper on International Conference on Sericulture, India.

HERMANTO (1992): “ Diversity of distribution of agriculture credit: a macro data analyze”.Pusat Penelitian Sosial Ekonomi Pertanian, Bogor. (in Bahasa Indonesia)

INTERNATIONAL TRADE CENTRE (ITC) UNCTAD/WTO (1997): “Silk Review 1997.” A Survey of International trends in production and trade”. Fifth Edition. Geneva.

INTERNATIONAL SERICULTURE COMMISION (ISC) and INTERNATIONAL SILK ASSOCIATION (ISA) (1995): “Joint Memorandum on The Problems of Sericulture Development”. France.

ISHAKA, R.S. (1998): “Factors Affecting The Successful and Unsuccessful groups Participating in The Income Generating (P4K) Project in West Nusa Tenggara Province, Indonesia”. Master Thesis. Scholl of Natural and Rural Management. The University of Queensland, Australia.

JAHNKE, H.E., DIETER-GILLWALD, I.,SHARIFI,R.A. (2001): “China and the Development of Sericulture“ in Geograpische Rundschau Oktober 10/2001.Westermann, Germany.

JACOBI, G. (1932): “Die Wirtschaftsgeographie der Seide”. Berlin.

KUJALA, J. (2003): “Project Management”. *Kon-41.002* Product development project http://www.machina.hut.fi/kurssit/41/002/Kujala_Project_lecture.pdf

KUSNAMAN, D. (1997): “Planung zur Entwicklung der Seidenproduktion in Indonesien” (Diplomarbeit).Humbldt University of Berlin, Germany.

LaFLEUR,P., BARLETT, J., and LOZADA, V. (1998):“Incremental Benefit-Cost Ratio” http://www.public.iastate.edu/~inde304/htm2/tutorials/incbcr2.htm

LEONARD, D.K. (1993): “Reaching the Peasant Farmer : Organization Theory and Practise in Kenya”. University of Chicago Press, Chicago.

LIEM, S.H., KIM, Y.T., LEE, S.P. (1990):”Sericulture Training Manual”. FAO Agricultural Services Bulletin No: 80. Rome, Italy.

MADELEY, J. (1991): “When Aid is No Help“. Intermediate Technology Publication, London

MARSHALL, H. E. (1999): “Sensitivity Analysis”. Technology Management Handbook. Chapter 8.12, CRC Press LLC, Boca Raton, FL, Dorf, R. C., Editor, 8/59-63 p. AND Engineering Handbook. Chapter 187, CRC Press, Inc., Boca Raton, FL, Dorf, R. C., Editor, 1962-1967 p., 1996, 1999. http://fire.nist.gov/bfrlpubs/build99/art012.html

MEENAKSHISUNDRAM, S.S. (1983): “Intensifying field-oriented research: a must”. Indian Silk *H. 4*, p. 3-8.

MELL, R. (1955): “Der Seidenspinner”. Wittenberg.

MESSERLI, B.E. (1986): “Seide“. In : Commision Europeene Promotion Soie (CEPS),. Hannover.

MOEDOKO, W. (2002): “Bombyx Mori Silk recent Development and Prospect in Indonesia”. A Paper to presentation Fourth International Conference on Wild Silk Moth. Yogyakarta, Indonesia.

PATEL, R. K. (1992): “Sericulture : An Instrument of Change, some grass root level lessons”. Indian Silk *H.7*, page: 24-35.

RANGASWAMI,G., et al. (1976): “Sericulture Manual, 1-Mulberry Cultivation”. FAO Agricultural Service Bulletin *15/1*. Rome, Italy.

RUDDLE, K., and ZHONG, G. (1988): “Integrated agriculture-aquaculture in South China”. The dike-pond system of the Zhujiang Delta. Cambridge.

RYU, C-H. (1998): “Panduan Teknis Persuteraan Alam”. Petunjuk dasar pesuteraan alam. PT. Indo Jado Sutera Pratama. Silk Industry. Jawa Barat. Indonesia

SAMSIJAH and KUSUMAPUTRA, A.S. (1982): “ Respon Tanaman Murbei Terhadap Pemberian Pupuk N,P,K di Tana Belange, Sulawesi Selatan”. Laporan No.394, page 55. Balai Penelitian Hutan, Bogor, West Java.

SAI GON GIAI PHONG (Liberated Sai Gon). (2003): “Compensation to silkworm farmers”. http://vietnamnews.vnagency.com.vn/2003 8/12/Columns/Domestic%20Press%20Highlights.htm

SATELLI, A., CHAN; K., SCOTT, E.M. (2002): “Sensitivity Analysis”. John Wiley & Sons Ltd., England.

SENGUPTA, K. (1989): “The Challenges of Sericulture Extension and Rural Development”. Indian Silk. H10. India.

SHARIFI, R. (1994): “Seidenraupenproduktion in der Welt und neuere Entwicklungen zur Produktivitätsverbesserung” (Diplomarbeit).Humboldt University of Berlin.

SINHA,S.S. (1994):“ Role of NGO in Sericuture Development”.Paper in International Conference on Sericuture. Banglore.India

SUNILDUTT, J., and CHOLE, R.R. (2002): “A Study on Adoption of Sericultural Practices by Sericulturists”. Research paper on The Indian Journal Sericulture, Vol.41, No.1, Mysore – India.

UNOPS (2000): “Sericulture Development Project”. http://www.unops.org.my/publications/newsletter/korea/intro.htm

VEDA, K., NAGAI, I., and HORIKOMI, M. (1997): “Silkworm Rearing”. Translated from Japanese. Science Publishers Inc, New Hampshire, United States of America.

Von Der RUHREN, N. (1994): “ Materialien-Handbuch Geographie “. Köln : Aulis-Verl.9 . Großmächte, Großräum.: IX, 331 p. ISBN: 3-7614-1525-7

VRIES, C. A. (1977): “de:Sericulture, bee-keeping and mushroom growing”. Bulletin *299*, Department of Agriculture Reasearch, Koninklijk Instituut voor de Tropen, Amsterdam.

WORLD BANK (2001): “Bangladesh-Silk Development Pilot Project”. http://www.worldbank-bangladesh.org

WUND, R.B (1996):” Kemitraan antara Industri Hilir dan Hulu dalam Bidang Usaha Persuteraan Alam”. Seminar Nasional Pesuteraan Alam. Lembaga Penelitian Universitas Padjajaran, Bandung, West Java, Indonesia.

YOST, C., and CARREIRO, R. (1999): “Analysis - Internal Rate of Return (IRR)”. http://www.investopedia.com/offsite.asp? URL=http://invest-faq.com/articles/analy-int-rate-return.html.

Appendix 1: The Price List of Fresh Cocoon per Kg (Rupiah)

Broken (%)	Cocoons skin (%)							
	17	**18**	**19**	**20**	**21**	**22**	**23**	**24**
0	17295	18445	19485	20215	20944	21676	22407	23136
1	16980	18119	19125	19836	20553	21268	21984	22699
2	16689	17793	18789	19488	20189	20890	21591	22292
3	16338	17467	18446	19129	19816	20504	21191	21878
4	16086	17141	18105	18776	19450	20121	20779	21468
5	15801	16815	17778	18436	19095	19753	20413	21073
6	15523	16531	17458	18100	18746	19393	20039	20685
7	15246	16247	17142	17770	18403	19036	19669	20302
8	14898	15963	16849	17467	18086	18706	19328	19947
9	14711	15679	16532	17139	17745	18352	18960	19567
10	14438	15395	16220	16812	17405	18000	18595	19189
11	14001	15147	15720	16290	16864	17438	18010	18584
12	13599	14707	15261	15812	16367	16920	17476	18029
13	13209	14279	14814	15348	15883	16419	16953	17490
14	12874	13912	14431	14949	15467	15987	16507	17025
15	12545	13551	14054	14556	15058	15562	16006	16570
16	12222	13198	13686	14172	14660	15148	15636	16124
17	11907	12853	13326	13796	14270	14743	15217	15689
18	11600	12516	12974	13431	13890	14348	14807	15266
19	11299	12147	12631	13072	13517	13961	14406	14849
20	11005	11865	12295	12723	13153	13583	14013	14444
21	10721	11553	11969	12384	12799	13216	13633	14050
22	10439	11245	11648	12050	12452	12856	13258	13662
23	10168	10948	11338	11725	12116	12506	12895	13286
24	9901	10657	11035	11412	11789	12167	12544	12923
25	9643	10373	10738	11101	11467	11831	12197	12562

Source: Banyumas Sutera Alam (2000)

Appendix 2: Requiring of mature silkworms

Banyumas Sutera Alam
Sericulture production in the first year
Expected **5 periods in year**

No.	Items	Period					Total
		1	2	3	4	5	
A	**Small size of farm**						
	Box of silkworms	0.25	0.25	0.25	0.25	0.25	**1.25**
B	**Middle size of farm**						
	Box of silkworms	0.50	0.50	0.50	0.50	0.50	**2.50**
C	**Large size of farm**						
	Box of silkworms	0.75	0.75	0.75	0.75	0.75	**3.75**

Banyumas Sutera Alam
Sericulture production in the second year
Expected **10 periods in year**

No.	Items	Period										Total
		6	7	8	9	10	11	12	13	14	15	
A	**Small size of farm**											
	Box of silkworms	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	**5.00**
B	**Middle size of farm**											
	Box of silkworms	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	**7.50**
C	**Large size of farm**											
	Box of silkworms	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	**10.00**

Sericulture production in the third year
Expected **10 periods in year**

No.	Items	Period										Total
		16	17	18	19	20	21	22	23	24	25	
A	**Small size of farm**											
	Box of silkworms	0.75	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	**5.25**
B	**Middle size of farm**											
	Box of silkworms	1.00	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	**7.75**
C	**Large size of farm**											
	Box of silkworms	2.00	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	**15.50**

Sericulture production in the forth year
Expected **10 periods in year**

No.	Items	Period										Total
		26	27	28	29	30	31	32	33	34	35	
A	**Small size of farm**											
	Box of silkworms	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	**10.00**
B	**Middle size of farm**											
	Box of silkworms	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	**20.00**
C	**Large size of farm**											
	Box of silkworms	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	**30.00**

Appendix 3: Expected of project revenue

(inUSD) **1 USD Rp 8,400.00**

Banyumas Sutera Alam

No.	Items	1st year	2nd year	3rd year	4th year
A.	**Small size of farm**				
1	***Total sales of fresh cocoons***	*65.00*	*260.00*	*312.38*	*595.00*
2	***Total sales of mulberry stecks***	20.00	107.14	107.14	0.00
	Total	**85.00**	**367.14**	**419.52**	**595.00**
B.	**Middle size of farm**				
1	***Total sales of fresh cocoons***	*130.00*	*390.00*	*461.13*	*1,190.00*
2	***Total sales of mulberry stecks***	30.00	160.71	241.07	0.00
	Total	**160.00**	**550.71**	**702.20**	**1,190.00**
C	**Large size of farm**				
1	***Total sales of fresh cocoons***	*195.00*	*520.00*	*922.25*	*1,785.00*
2	***Total sales of mulberry stecks***	40.00	214.29	321.43	0.00
	Total	**235.00**	**734.29**	**1,243.68**	**1,785.00**

Note:

1 box silkworm = 25 kg fresh cocoons 1999 Year : 2.08 USD 2001 Year : 2.38 USD

Price 1 kg fresh cocoons : 2000 Year : 2.08 USD 2002 Year : 2.38 USD

Sales of mulberry stecks

No.	Item	Quantity	Unit	Price/Unit	Total
A	**Small size of farm**				
	1st year	10,000	pcs	0.002 USD	20.000 USD
	2nd year	30,000	pcs	0.004 USD	107.143 USD
	3rd year	30,000	pcs	0.004 USD	107.143 USD
	4th year	0	pcs	0.004 USD	0.000 USD
B.	**Middle size of farm**				
	1st year	15,000	pcs	0.002 USD	30.000 USD
	2nd year	45,000	pcs	0.004 USD	160.714 USD
	3rd year	67,500	pcs	0.004 USD	241.071 USD
	4th year	0	pcs	0.004 USD	0.000 USD
C	**Large size of farm**				
	1st year	20,000	pcs	0.002 USD	40.000 USD
	2nd year	60,000	pcs	0.004 USD	214.286 USD
	3rd year	90,000	pcs	0.004 USD	321.429 USD
	4th year	0	pcs	0.000 USD	0.000 USD

Appendix 4.1: Cost of production for small size of farm (1st Year and 2nd Year)

in USD **1 USD** **8,400 USD**

No	Description	Unit	1st Year				2nd Year			
			Price/unit	Qty	Sum	% of costs	Price/unit	Qty	Sum	% of costs
A.	***Mulberry Section***									
I	**Leasing of land**	ha	47.06	0.00	0.00		47.06	0.50	23.53	36.09%
II	**Labour**	mandays	0.59	20.00	11.76	69.31%	0.71	20.00	14.29	21.91%
III	**Fertilizer :**									
III.1	Organic fertilizer	kg	0.00	0.00	0.00	0.00%	0.01	2,500.00	17.86	27.39%
III.2	An organic fertilizer :									
III.3	Urea (N)	kg	0.07	12.50	0.89	5.26%	0.09	25.00	2.23	3.42%
III.4	TSP	kg	0.11	6.25	0.67	3.95%	0.13	12.50	1.56	2.40%
III.5	KCL	kg	0.11	6.25	0.67	3.95%	0.13	12.50	1.56	2.40%
IV	**Herbicide & pesticide**	lt.	2.98	1.00	2.98	17.53%	4.17	1.00	4.17	6.39%
	Sub total A				**16.97**	**100.00%**			**65.20**	**100.00%**
B.	***Silkwom Section***									
I	**Grownup silkworms**	box	5.36	1.25	6.70	30.24%	8.33	5.00	41.67	35.90%
II	**Chemical :**									
II.1	Lime powder	kg	0.12	1.25	0.15	0.67%	0.12	5.00	0.60	0.51%
II.3	Popzol	kg	0.48	1.25	0.60	2.69%	0.48	5.00	2.38	2.05%
III	**Labour**	mandays	0.59	25.00	14.71	66.40%	0.71	100	71.43	61.54%
	Sub total B				**22.15**	**100.00%**			**116.07**	**100.00%**
	Total Costs (A+B)				**39.12**				**181.27**	

Note:

1 box silkworms required of labor 20 mandays

Appendix 4.2: Cost of production for small size of farm (3rdYear and 4th Year)

in USD

No	Description	Unit	3rd Year				4th Year			
			Price/unit	Qty	Sum	% of costs	Price/unit	Qty	Sum	% of costs
A.	***Mulberry Section***									
I	**Leasing of land**	ha	47.06	0.50	23.53	31.03%	47.06	0.50	23.53	31.06%
II	**Labour**	mandays	0.89	20.00	17.86	23.55%	0.89	20.00	17.80	23.49%
III	**Fertilizer :**									
III.1	Organic fertilizer	kg	0.01	2,500.00	22.32	29.44%	0.01	2,500.00	22.32	29.46%
III.2	An organic fertilizer :									
III.3	Urea (N)	kg	0.14	25.00	3.48	4.59%	0.14	25.00	3.48	4.60%
III.4	TSP	kg	0.18	12.50	2.23	2.94%	0.18	12.50	2.23	2.95%
III.5	KCL	kg	0.18	12.50	2.23	2.94%	0.18	12.50	2.23	2.95%
IV	**Herbicide & pesticide**	lt.	4.17	1.00	4.17	5.50%	4.17	1.00	4.17	5.50%
	Sub total A				**75.82**	**100%**			**75.76**	**100.00%**
B.	***Silkwom Section***									
I	**Grownup silkworms**	box	8.33	3.75	31.25	21.21%	10.71	10.00	107.10	36.06%
			10.71	1.50	16.07	10.91%				
II	**Chemical :**									
II.1	Lime powder	kg	0.60	5.25	3.13	2.12%	0.60	10.00	5.95	2.00%
II.3	Popzol	kg	0.60	5.25	3.13	2.12%	0.60	10.00	5.95	2.00%
III	**Labour**	mandays	0.89	105	93.75	63.64%	0.89	200.00	178.00	59.93%
	Sub total B				**147.32**	**100.00%**			**297.00**	**100.00%**
	Total Costs (A+B)				**223.14**				**372.77**	

Note:

1 box silkworms required of labor 20 mandays

Appendix 5.1: Cost of production for middle size of farm (1st Year and 2nd Year)

Middle size of farm
in USD **1 USD** **8,400 USD**

No	Description	Unit	1st Year				2nd Year			
			Price/unit	Qty	Sum	% of costs	Price/unit	Qty	Sum	% of costs
A.	***Mulberry Section***									
I	**Leasing of land**	ha	47.06	0.00	0.00	0.00%	47.06	0.50	23.53	19.76%
II	**Labour**	mandays	0.59	60.00	35.29	79.81%	0.71	60.00	42.86	35.99%
III	**Fertilizer :**									
III.1	Organic fertilizer	kg	0.00	0.00	0.00	0.00%	0.01	5,000.00	35.71	30.00%
III.2	An organic fertilizer :									
III.3	Urea (N)	kg	0.07	25.00	1.79	4.04%	0.09	50.00	4.46	3.75%
III.4	TSP	kg	0.11	12.50	1.34	3.03%	0.13	25.00	3.13	2.62%
III.5	KCL	kg	0.11	12.50	1.34	3.03%	0.13	25.00	3.13	2.62%
IV	**Herbicide & pesticide**	lt.	2.98	1.50	4.46	10.10%	4.17	1.50	6.25	5.25%
	Sub total A				**44.22**	**100.00%**			**119.07**	**100%**
B.	***Silkwom Section***									
I	**Grownup silkworms**	box	5.36	2.50	13.39	30.24%	8.33	7.50	62.50	35.90%
II	**Chemical :**									
II.1	Lime powder	kg	0.12	2.50	0.30	0.67%	0.12	7.50	0.89	0.51%
II.3	Popzol	kg	0.48	2.50	1.19	2.69%	0.48	7.50	3.57	2.05%
III	**Labour**	mandays	0.59	50.00	29.41	66.40%	0.71	150	107.14	61.54%
	Sub total B				**44.29**	**100.00%**			**174.11**	**100.00%**
	Total Costs (A+B)				**88.52**				**293.17**	

Note:
1 box silkworms required of labor 20 mandays

Appendix 5.2: Cost of production for middle size of farm (3rdYear and 4th Year)

Middle size of farm
in USD

No	Description	Unit	3rd Year				4th Year			
			Price/unit	Qty	Sum	% of costs	Price/unit	Qty	Sum	% of costs
A.	***Mulberry Section***									
I	**Leasing of land**	ha	47.06	0.50	23.53	16.35%	47.06	0.50	23.53	16.37%
II	**Labour**	mandays	0.89	60.00	53.57	37.23%	0.89	60.00	53.40	37.16%
III	**Fertilizer :**									
III.1	Organic fertilizer	kg	0.01	5,000.00	44.64	31.03%	0.01	5,000.00	44.64	31.06%
III.2	An organic fertilizer :									
III.3	Urea (N)	kg	0.14	50.00	6.96	4.84%	0.14	50.00	6.96	4.85%
III.4	TSP	kg	0.18	25.00	4.46	3.10%	0.18	25.00	4.46	3.11%
III.5	KCL	kg	0.18	25.00	4.46	3.10%	0.18	25.00	4.46	3.11%
IV	**Herbicide & pesticide**	lt.	4.17	1.50	6.25	4.34%	4.17	1.50	6.25	4.35%
	Sub total A				**143.89**	**83.65%**			**143.72**	**83.63%**
B.	***Silkwom Section***									
I	**Grownup silkworms**	box	8.33	5.50	45.83	21.07%	10.71	20.00	214.20	36.06%
			10.71	2.25	24.11	11.08%				
II	**Chemical :**									
II.1	Lime powder	kg	0.60	7.75	4.61	2.12%	0.60	20.00	11.90	2.00%
II.3	Popzol	kg	0.60	7.75	4.61	2.12%	0.60	20.00	11.90	2.00%
III	**Labour**	mandays	0.89	155	138.39	63.61%	0.89	400.00	356.00	59.93%
	Sub total B				**217.56**	**100.00%**			**594.01**	**100.00%**
	Total Costs (A+B)				**361.45**				**737.72**	

Note:
1 box silkworms required of labor 20 mandays

Appendix 6.1: Cost of production for larger size of farm (1st Year and 2nd Year)

Large size of farm
in USD **1 USD** **Rp8,400.00**

No	Description	Unit	1st Year				2nd Year			
			Price/unit	Qty	Sum	% of costs	Price/unit	Qty	Sum	% of costs
A.	***Mulberry Section***									
I	**Leasing of land**	ha	47.06	0.00	0.00	0.00%	47.06	1.00	47.06	19.76%
II	**Labour**	mandays	0.59	120.00	70.59	79.81%	0.71	120.00	85.71	35.99%
III	**Fertilizer :**									
III.1	Organic fertilizer	kg	0.00	0.00	0.00	0.00%	0.01	10,000.00	71.43	30.00%
III.2	An organic fertilizer :									
III.3	Urea (N)	kg	0.07	50.00	3.57	4.04%	0.09	100.00	8.93	3.75%
III.4	TSP	kg	0.11	25.00	2.68	3.03%	0.13	50.00	6.25	2.62%
III.5	KCL	kg	0.11	25.00	2.68	3.03%	0.13	50.00	6.25	2.62%
IV	**Herbicide & pesticide**	lt.	2.98	3.00	8.93	10.10%	4.17	3.00	12.50	5.25%
	Sub total A				**88.45**	**100.00%**			**238.13**	**100.00%**
B.	***Silkwom Section***									
I	**Grownup silkworms**	box	5.36	3.75	20.09	30.24%	8.33	10.00	83.33	35.90%
II	**Chemical :**									
II.1	Lime powder	kg	0.12	3.75	0.45	0.67%	0.12	10.00	1.19	0.51%
II.3	Popzol	kg	0.48	3.75	1.79	2.69%	0.48	10.00	4.76	2.05%
III	**Labour**	mandays	0.59	75	44.12	66.40%	0.71	200	142.86	61.54%
	Sub total B				**66.44**	**100.00%**			**232.14**	**100.00%**
	Total Costs (A+B)				**154.88**				**470.27**	

Note:
1 box silkworms required of labor 20 mandays

Appendix 6.2: Cost of production for larger size of farm (3rdYear and 4th Year)

Large size of farm
in USD

No	Description	Unit	3rd Year				4th Year			
			Price/unit	Qty	Sum	% of costs	Price/unit	Qty	Sum	% of costs
A.	***Mulberry Section***									
I	**Leasing of land**	ha	47.06	1.00	47.06	16.35%	47.06	1.00	47.06	16.37%
II	**Labour**	mandays	0.89	120.00	107.14	37.23%	0.89	120.00	106.80	37.16%
III	**Fertilizer :**									0.00%
III.1	Organic fertilizer	kg	0.01	10,000.00	89.29	31.03%	0.01	10,000.00	89.29	31.06%
III.2	An organic fertilizer :									0.00%
III.3	Urea (N)	kg	0.14	100.00	13.93	4.84%	0.14	100.00	13.93	4.85%
III.4	TSP	kg	0.18	50.00	8.93	3.10%	0.18	50.00	8.93	3.11%
III.5	KCL	kg	0.18	50.00	8.93	3.10%	0.18	50.00	8.93	3.11%
IV	**Herbicide & pesticide**	lt.	4.17	3.00	12.50	4.34%	4.17	3.00	12.50	4.35%
	Sub total A				**287.77**	**100%**			**287.43**	**100%**
B.	***Silkwom Section***									
I	**Grownup silkworms**	box	8.33	11.00	91.67	21.07%	10.71	30.00	321.30	36.80%
			10.71	4.50	48.21	11.08%				
II	**Chemical :**									
II.1	Lime powder	kg	0.60	15.50	9.23	2.12%	0.12	30.00	3.57	0.41%
II.3	Popzol	kg	0.60	15.50	9.23	2.12%	0.48	30.00	14.29	1.64%
III	**Labour**	mandays	0.89	310	276.79	63.61%	0.89	600.00	534.00	61.16%
	Sub total B				**435.12**	**100.00%**			**873.16**	**100.00%**
	Total Costs (A+B)				**722.89**				**1,160.59**	

Note:
1 box silkworms required of labor 20 mandays

Appendix 7: Population of Banjarnegara, Banyumas, Pekalongan, Purbalingga and Tegal (in 1999)

No	Description	Unit	Value
Banjarnegara			
1	Population Density	Per Km2	781
2	Population	Thousand	835,964
3	Population Growth	%	0.80
4	Households	Thousand	199,776
5	Household members	Average	4.20
Banyumas			
1	Population Density	Per Km2	1,107
2	Population	person	1,470,180
3	Population Growth	%	0.78
4	Households	Thousand	359,432
5	Household members	Average	4.00
Pekalongan			
1	Population Density	Per Km2	879
2	Population	person	734,887
3	Population Growth	%	1.38
4	Households	Thousand	161,536
5	Household members	Average	4.50
Purbalingga			
1	Population Density	Per Km2	987
2	Population	person	767,590
3	Population Growth	%	0.72
4	Households	Thousand	179,808
5	Household members	Average	4.30
Tegal			
1	Population Density	Per Km2	9,917
2	Population	person	1,335,000
3	Population Growth	%	-
4	Households	Thousand	-
5	Household members	Average	4.50

Source: BPS Jawa Tengah Provincial Office
http://jateng.bps.go.id/mp28.htm

Appendix 8: Average of relative humidity,-rainfalls and temperature by several stations in Jawa Tengah.

No	Station	1997	1998	1999	2000	2001
Relatife Humidity (in %)						
1	Bojongsari, Purwokerto	83.00	83.00	83.00	91.00	88.00
2	Kr.Kemiri Purbalingga	82.00	84.00	84.00	84.00	*
3	Meteorologi Tegal	78.00	82.00	80.00	82.00	82.00
4	Wadaslintang, Wonosobo	78.00	80.00	79.00	78.00	79.00
Rainfalls (in mm)						
1	Bojongsari, Purwokerto	1447	3868	2610	2480	3569
2	Kr.Kemiri Purbalingga	1504	3968	2973	3322	*
3	Meteorologi Tegal	1495	1866	1772	1842	2137
4	Wadaslintang, Wonosobo	1776	5547	3990	4277	4699
Temperature (in celcius)						
1	Bojongsari, Purwokerto	25.20	25.60	25.60	25.30	25.70
2	Kr.Kemiri Purbalingga	26.50	27.90	26.90	27.10	*
3	Meteorologi Tegal	26.90	27.70	27.00	27.00	27.10
4	Wadaslintang, Wonosobo	25.40	26.20	25.60	25.40	26.40

Appendix 9: 1st Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 1 **1 USD : Rp 8,400.00**

Total BW : **1.00 Box** **Price of BW/Box: USD 5.36**

Month:	***May-99***		**Sales**							**Cost**				
ID	**Land (Ha)**	**BW (Box)**	**fresh cocoons (good quality)**			**poor quality**			**Total Sales (I+II) (USD)**				**Total Cost (USD)**	**Total Revenue (USD)**
			Co (Kg)	**Price/kg (USD)**	**Total I (USD)**	**Co (Kg)**	**Price/kg (USD)**	**Total II (USD)**		**BW (USD)**	**Papzol (USD)**	**CaCo3 (USD)**		
1026	3.00	1.00	32.00	1.96	62.86	2.00	0.12	0.24	63.10	5.36	0.48	0.12	5.95	**57.14**
Total	**3.00**	**1.00**	**32.00**		**62.86**	**2.00**		**0.24**	**63.10**	**5.36**	**0.48**	**0.12**	**5.95**	**57.14**

BW : Baby worms ***Average price of fresh cocoons /kg*** **1.96 USD**

Co : Cocoons ***Average productions of fresh cocoon*** **32.00 Kg**

	Average	
	Cocoons/box (Kg)	**Price of cocoons/kg (USD)**
Larger size of farm	32.00	1.96
Middle size of farm	0.00	-
Small size of farm	0.00	-

Appendix 10: 2nd Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 2 **1 USD : Rp 8,400.00**

Total BW : **1.00 Box** **Price of BW/Box: USD 5.36**

Month:	***Jun-99***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total**				**Total**	**Total**
			Co	**Price/kg**	**Total I**	**Co**	**Price/kg**	**Total II**	**Sales (I+II)**	**BW**	**Papzol**	**CaCo3**	**Cost**	**Revenue**
	(Ha)	**(Box)**	**(Kg)**	**(USD)**	**(USD)**	**(Kg)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**
1026	3.00	1.00	32.50	2.08	67.71	3.00	0.12	0.36	68.07	5.36	0.48	0.12	5.95	**62.11**
Total	**3.00**	**1.00**	**32.50**		**67.71**	**3.00**		**0.36**	**68.07**	**5.36**	**0.48**	**0.12**	**5.95**	**62.11**

BW : Baby worms ***Average price of fresh cocoons /kg*** **2.08 USD**

Co : Cocoons ***Average productions of fresh cocoons /box*** **32.50 Kg**

	Average	
	Cocoons/box	**Price of cocoons/kg**
	(Kg)	**(USD)**
Larger size of farm	32.50	2.08
Middle size of farm	0.00	-
Small size of farm	0.00	-

Appendix 11: 3rd Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 3 **1 USD : Rp 8,400.00**

Total BW : **1.00 Box** **Price of BW/Box: USD 5.36**

Month:	***Jul-99***		**Sales**							**Cost**				
ID	**Land (Ha)**	**BW (Box)**	**fresh cocoons (good quality)**			**poor quality**			**Total Sales (I+II) (USD)**	**BW (USD)**	**Papzol (USD)**	**CaCo3 (USD)**	**Total Cost (Rp)**	**Total Revenue (USD)**
			Co (Kg)	**Price/kg (USD)**	**Total I (USD)**	**Co (Kg)**	**Price/kg (USD)**	**Total II (USD)**						
1026	3.00	1.00	31.50	2.08	65.63	2.50	0.12	0.30	65.92	5.36	0.48	0.12	5.95	**59.97**
Total	**3.00**	**1.00**	**31.50**		**65.63**	**2.50**		**0.30**	**65.92**	**5.36**	**0.48**	**0.12**	**5.95**	**59.97**

BW : Baby worms ***Average price of fresh cocoons /kg*** **2.08 USD**

Co : Cocoons ***Average productions of fresh cocoons /bo*** **31.50 Kg**

	Average	
	Cocoons/box (Kg)	**Price of cocoons/kg (USD)**
Larger size of farm	31.50	2.08
Middle size of farm	0.00	-
Small size of farm	0.00	-

Appendix 12: 4th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 4 **1 USD : Rp 8,400.00**

Total BW : **1.50 Box** **Price of BW/Box: USD 5.36**

Month:	***Sep-99***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total**				**Total**	**Total**
			Co	**Price/kg**	**Total I**	**Co**	**Price/kg**	**Total II**	**Sales (I+II)**	**BW**	**Papzol**	**CaCo3**	**Cost**	**Revenue**
	(Ha)	**(Box)**	**(Kg)**	**(USD)**	**(USD)**	**(Kg)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**
1026	3.00	1.50	40.00	2.08	83.33	2.00	0.12	0.24	83.57	8.04	0.71	0.18	8.93	**74.64**
Total	**3.00**	**1.50**	**40.00**		**83.33**	**2.00**		**0.24**	**83.57**	**8.04**	**0.71**	**0.18**	**8.93**	**74.64**

BW : Baby worms ***Average price of fresh cocoons /kg*** **2.08 USD**

Co : Cocoons ***Average productions of fresh cocoons /l*** **26.67 Kg**

	Average	
	Cocoons/box	**Price of cocoons/kg**
	(Kg)	**(USD)**
Larger size of farm	26.67	2.08
Middle size of farm	0.00	-
Small size of farm	0.00	-

Appendix 13: 5th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 5 **1 USD : Rp 8,400.00**

Total BW : **2.00 Box** **Price of BW/Box: 5.36 USD**

Month:	***Oct-99***		**Sales**							**Cost**				
ID	**Land (Ha)**	**BW (Box)**	**fresh cocoons (good quality)**			**poor quality**			**Total Sales (I+II) (USD)**	**BW (USD)**	**Papzol (USD)**	**CaCo3 (USD)**	**Total Cost (USD)**	**Total Revenue (USD)**
			Co (Kg)	**Price/kg (USD)**	**Total I (USD)**	**Co (Kg)**	**Price/kg (USD)**	**Total II (USD)**						
1026	3.00	2.00	50.50	2.26	114.23	1.00	0.12	0.12	114.35	10.71	0.95	0.24	11.90	**102.44**
Total	**3.00**	**2.00**	**50.50**		**114.23**	**1.00**		**0.12**	**114.35**	**10.71**	**0.95**	**0.24**	**11.90**	**102.44**

BW : Baby worms ***Average price of fresh cocoons /kg*** **2.26 USD**

Co : Cocoons ***Average productions of fresh cocoons /box*** **25.25 Kg**

	Average	
	Cocoons/box (Kg)	**Price of cocoons/kg (USD)**
Larger size of farm	25.25	2.26
Middle size of farm	0.00	-
Small size of farm	0.00	-

Appendix 14: 6th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 6 **1 USD : Rp 8,400.00**

Total BW : **2.00 Box** **Price of BW/Box: 5.36 USD**

Month:	***Nov-99***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total**				**Total**	**Total**
			Co	**Price/kg**	**Total I**	**Co**	**Price/kg**	**Total II**	**Sales (I+II)**	**BW**	**Papzol**	**CaCo3**	**Cost**	**Revenue**
	(Ha)	**(Box)**	**(Kg)**	**(USD)**	**(USD)**	**(Kg)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(Rp)**	**(USD)**
1026	3.00	2.00	55.00	2.20	121.13	2.50	0.12	0.30	121.43	10.71	0.95	0.24	11.90	**109.52**
Total	**3.00**	**2.00**	**55.00**		**121.13**	**2.50**		**0.30**	**121.43**	**10.71**	**0.95**	**0.24**	**11.90**	**109.52**

BW : Baby worms ***Average price of fresh cocoons /kg*** **2.20 USD**

Co : Cocoons ***Average productions of fresh cocoons /box*** **27.50 Kg**

	Average	
	Cocoons/box	**Price of cocoons/kg**
	(Kg)	**(USD)**
Larger size of farm	27.50	2.20
Middle size of farm	0.00	-
Small size of farm	0.00	-

Appendix 15: 7th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 7 **1 USD : Rp 8,400.00**

Total BW : **5.50 Box** **Price of BW/Box: 5.36 USD**

Month: ***Nov-99***			Sales							Cost				
ID	Land (Ha)	BW (Box)	fresh cocoons (good quality) Co (Kg)	Price/kg (USD)	Total I (USD)	poor quality Co (Kg)	Price/kg (USD)	Total II (USD)	Total Sales (I+II) (USD)	BW (USD)	Papzol (USD)	CaCo3 (USD)	Total Cost (USD)	Total Revenue (USD)
4011	0.50	0.25	5.50	2.08	11.46	2.00	0.12	0.24	11.70	1.34	0.12	0.03	1.49	**10.21**
4012	0.50	0.25	6.00	1.79	10.71	2.50	0.12	0.30	11.01	1.34	0.12	0.03	1.49	**9.52**
4015	0.50	0.50	14.70	2.26	33.25	2.50	0.12	0.30	33.55	2.68	0.24	0.06	2.98	**30.57**
4017	0.50	0.50	15.50	1.79	27.68	1.50	0.12	0.18	27.86	2.68	0.24	0.06	2.98	**24.88**
4007	0.75	0.50	12.50	2.08	26.04	3.00	0.12	0.36	26.40	2.68	0.24	0.06	2.98	**23.42**
4001	1.00	0.75	17.50	2.26	39.58	2.00	0.12	0.24	39.82	4.02	0.36	0.09	4.46	**35.36**
4002	1.00	0.75	18.00	2.08	37.50	1.00	0.12	0.12	37.62	4.02	0.36	0.09	4.46	**33.15**
1026	3.00	2.00	48.00	2.26	108.57	3.00	0.12	0.36	108.93	10.71	0.95	0.24	11.90	**97.02**
Total	**7.75**	**5.50**	**137.70**		**294.80**	**17.50**		**2.08**	**296.88**	**29.46**	**2.62**	**0.65**	**32.74**	**264.14**

BW : Baby worms ***Average price of fresh cocoons /kg*** **2.08 USD**

Co : Cocoons ***Average productions of fresh cocoons /box*** **25.04 Kg**

	Average	
	Cocoons/box (Kg)	Price of cocoons/kg (USD)
Larger size of farm	23.86	2.20
Middle size of farm	27.10	2.00
Small size of farm	0.00	-

Appendix 16: 8th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 8 **1 USD : Rp 8,400.00**

Total BW : **5.50 Box** **Price of BW/Box: 8.33 USD**

Month:	***Dec-99***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total**				**Total**	**Total**
	(Ha)	**(Box)**	**Co (Kg)**	**Price/kg (USD)**	**Total I (USD)**	**Co (Kg)**	**Price/kg (USD)**	**Total II (USD)**	**Sales (I+II) (USD)**	**BW (USD)**	**Papzol (USD)**	**CaCo3 (USD)**	**Cost (USD)**	**Revenue (USD)**
4018	0.50	0.50	14.00	2.20	30.83	1.50	0.12	0.18	31.01	4.17	0.24	0.06	4.46	**26.55**
4019	0.50	0.50	14.50	2.08	30.21	1.50	0.12	0.18	30.39	4.17	0.24	0.06	4.46	**25.92**
4022	0.75	0.50	12.50	2.08	26.04	3.00	0.12	0.36	26.40	4.17	0.24	0.06	4.46	**21.93**
4012	0.75	0.50	13.00	2.08	27.08	2.50	0.12	0.30	27.38	4.17	0.24	0.06	4.46	**22.92**
4007	0.75	0.50	14.00	2.14	30.00	2.00	0.12	0.24	30.24	4.17	0.24	0.06	4.46	**25.77**
4003	1.00	0.50	16.90	2.08	35.21	1.00	0.12	0.12	35.33	4.17	0.24	0.06	4.46	**30.86**
4004	1.00	0.50	15.00	1.79	26.79	3.00	0.12	0.36	27.14	4.17	0.24	0.06	4.46	**22.68**
1026	3.00	2.00	43.00	2.20	94.70	3.50	0.12	0.42	95.12	16.67	0.95	0.24	17.86	**77.26**
Total	**8.25**	**5.50**	**142.90**		**300.86**	**18.00**		**2.14**	**303.01**	**45.83**	**2.62**	**0.65**	**49.11**	**253.90**

BW : Baby worms ***Average price of fresh cocoons /kg*** **2.08 USD**

Co : Cocoons ***Average productions of fresh cocoons /box*** **25.98 Kg**

	Average	
	Cocoons/box (Kg)	**Price of cocoons/kg (USD)**
Larger size of farm	24.97	2.02
Middle size of farm	27.20	2.12
Small size of farm	0.00	-

Appendix 17: 9th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 9 **1 USD : Rp 8,400.00**

Total BW : **10.00 Box** **Price of BW/Box: 8.33 USD**

Month:	***Jan-00***		**Sales**							**Cost**				
ID	**Land (Ha)**	**BW (Box)**	**fresh cocoons (good quality)**			**poor quality**			**Total Sales (I+II) (USD)**	**BW (USD)**	**Papzol (USD)**	**CaCo3 (USD)**	**Total Cost (USD)**	**Total Revenue (USD)**
			Co (Kg)	**Price/kg (USD)**	**Total I (USD)**	**Co (Kg)**	**Price/kg (USD)**	**Total II (USD)**						
1012	0.50	0.25	6.00	1.67	10.00	3.00	0.12	0.36	10.36	2.08	0.12	0.03	2.23	**8.13**
1013	0.50	0.25	6.00	1.67	10.00	5.00	0.12	0.60	10.60	2.08	0.12	0.03	2.23	**8.36**
1014	0.50	0.25	5.00	1.67	8.33	2.50	0.12	0.30	8.63	2.08	0.12	0.03	2.23	**6.40**
1016	0.50	0.25	7.00	2.08	14.58	2.00	0.12	0.24	14.82	2.08	0.12	0.03	2.23	**12.59**
1019	0.50	0.25	5.00	1.67	8.33	5.00	0.12	0.60	8.93	2.08	0.12	0.03	2.23	**6.70**
1028	0.50	0.25	6.00	2.08	12.50	3.00	0.12	0.36	12.86	2.08	0.12	0.03	2.23	**10.63**
2054	0.50	0.25	6.50	2.08	13.54	1.00	0.12	0.12	13.66	2.08	0.12	0.03	2.23	**11.43**
2055	0.50	0.25	6.50	2.32	15.09	2.00	0.12	0.24	15.33	2.08	0.12	0.03	2.23	**13.10**
4011	0.50	0.25	6.50	2.08	13.54	2.00	0.12	0.24	13.78	2.08	0.12	0.03	2.23	**11.55**
4012	0.50	0.25	6.00	2.32	13.93	2.50	0.12	0.30	14.23	2.08	0.12	0.03	2.23	**11.99**
4015	0.50	0.25	7.00	2.08	14.58	0.50	0.12	0.06	14.64	2.08	0.12	0.03	2.23	**12.41**
4022	0.50	0.25	6.50	2.32	15.09	2.30	0.12	0.27	15.36	2.08	0.12	0.03	2.23	**13.13**
2060	0.50	0.50	15.00	2.32	34.82	0.50	0.12	0.06	34.88	4.17	0.24	0.06	4.46	**30.42**
2061	0.50	0.50	14.00	2.32	32.50	-	0.12	-	32.50	4.17	0.24	0.06	4.46	**28.04**
2062	0.50	0.50	12.00	1.67	20.00	1.00	0.12	0.12	20.12	4.17	0.24	0.06	4.46	**15.65**
4009	1.00	0.50	12.00	1.67	20.00	-	0.12	-	20.00	4.17	0.24	0.06	4.46	**15.54**
4005	1.00	0.50	12.50	1.67	20.83	2.50	0.12	0.30	21.13	4.17	0.24	0.06	4.46	**16.67**
4006	1.00	0.50	12.00	1.67	20.00	5.00	0.12	0.60	20.60	4.17	0.24	0.06	4.46	**16.13**
2010	1.00	0.50	15.00	1.67	25.00	-	0.12	-	25.00	4.17	0.24	0.06	4.46	**20.54**
4010	1.00	0.50	14.00	2.08	29.17	2.50	0.12	0.30	29.46	4.17	0.24	0.06	4.46	**25.00**
4013	1.00	0.50	14.00	2.32	32.50	4.50	0.12	0.54	33.04	4.17	0.24	0.06	4.46	**28.57**
4014	1.00	0.50	15.00	2.32	34.82	2.00	0.12	0.24	35.06	4.17	0.24	0.06	4.46	**30.60**
1026	3.00	2.00	35.00	2.32	81.25	2.50	0.12	0.30	81.55	16.67	0.95	0.24	17.86	**63.69**
Total	**17.50**	**10.00**	**244.50**		**500.42**	**51.30**		**6.11**	**506.52**	**83.33**	**4.76**	**1.19**	**89.29**	**417.24**

BW : Baby worms ***Average price of fresh cocoons /kg*** **2.00 USD**

Co : Cocoons ***Average productions of fresh cocoons /box*** **24.45 Kg**

	Average	
	Cocoons/box (Kg)	**Price of cocoons/kg (USD)**
Larger size of farm	23.55	1.96
Middle size of farm	25.56	2.02
Small size of farm	0.00	-

Appendix 18: 10th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 10 **1 USD : Rp 8,400.00**

Total BW : **13.75 Box** **Price of BW/Box: 8.33 USD**

Month:	***Feb-00***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total Sales (I+II) (USD)**				**Total Cost (USD)**	**Total Revenue (USD)**
	(Ha)	**(Box)**	**Co (Kg)**	**Price/kg (USD)**	**Total I (USD)**	**Co (Kg)**	**Price/kg (USD)**	**Total II (USD)**		**BW (USD)**	**Papzol (USD)**	**CaCo3 (USD)**		
2063	0.50	0.25	7.50	2.08	15.63	2.50	0.12	0.30	15.92	2.08	0.12	0.03	2.23	**13.69**
2006	0.50	0.25	8.00	2.32	18.57	1.00	0.12	0.12	18.69	2.08	0.12	0.03	2.23	**16.46**
2017	0.50	0.25	6.00	2.32	13.93	2.00	0.12	0.24	14.17	2.08	0.12	0.03	2.23	**11.93**
2019	0.50	0.25	7.00	2.32	16.25	1.00	0.12	0.12	16.37	2.08	0.12	0.03	2.23	**14.14**
2020	0.50	0.25	6.50	1.67	10.83	6.00	0.12	0.71	11.55	2.08	0.12	0.03	2.23	**9.32**
2024	0.50	0.25	9.00	2.32	20.89	1.00	0.12	0.12	21.01	2.08	0.12	0.03	2.23	**18.78**
2025	0.50	0.25	8.00	2.08	16.67	-	0.12	-	16.67	2.08	0.12	0.03	2.23	**14.43**
2026	0.50	0.25	6.00	2.08	12.50	2.50	0.12	0.30	12.80	2.08	0.12	0.03	2.23	**10.57**
2047	0.50	0.25	7.50	2.08	15.63	-	0.12	-	15.63	2.08	0.12	0.03	2.23	**13.39**
2027	0.50	0.50	13.00	2.08	27.08	1.00	0.12	0.12	27.20	4.17	0.24	0.06	4.46	**22.74**
2028	0.50	0.50	14.00	2.08	29.17	-	0.12	-	29.17	4.17	0.24	0.06	4.46	**24.70**
4016	1.00	0.75	17.00	2.08	35.42	2.50	0.12	0.30	35.71	6.25	0.36	0.09	6.70	**29.02**
4021	1.00	0.75	18.90	2.32	43.88	2.50	0.12	0.30	44.17	6.25	0.36	0.09	6.70	**37.48**
4001	1.00	0.75	18.00	2.32	41.79	2.30	0.12	0.27	42.06	6.25	0.36	0.09	6.70	**35.36**
4002	1.00	1.00	25.00	2.32	58.04	1.00	0.12	0.12	58.15	8.33	0.48	0.12	8.93	**49.23**
4003	1.00	1.00	24.00	2.32	55.71	0.50	0.12	0.06	55.77	8.33	0.48	0.12	8.93	**46.85**
2014	1.00	0.75	16.00	2.32	37.14	3.50	0.12	0.42	37.56	6.25	0.36	0.09	6.70	**30.86**
2011	1.00	0.75	15.00	2.32	34.82	2.00	0.12	0.24	35.06	6.25	0.36	0.09	6.70	**28.36**
2012	1.00	0.75	16.00	2.32	37.14	0.50	0.12	0.06	37.20	6.25	0.36	0.09	6.70	**30.51**
4008	1.50	1.00	24.00	2.32	55.71	-	0.12	-	55.71	8.33	0.48	0.12	8.93	**46.79**
4020	1.50	1.00	25.00	2.32	58.04	1.00	0.12	0.12	58.15	8.33	0.48	0.12	8.93	**49.23**
1026	3.00	2.00	37.50	2.08	78.13	5.50	0.12	0.65	78.78	16.67	0.95	0.24	17.86	**60.92**
Total	**19.50**	**13.75**	**328.90**		**732.95**	**38.30**		**4.56**	**737.51**	**114.58**	**6.55**	**1.64**	**122.77**	**614.74**

BW : Baby worms ***Average price of fresh cocoons /kg*** **2.21 USD** -

Co : Cocoons ***Average productions of fresh cocoons /box*** **23.92 Kg**

	Average	
	Cocoons/box (Kg)	**Price of cocoons/kg (USD)**
Larger size of farm	22.51	2.28
Middle size of farm	28.46	2.13
Small size of farm	0.00	-

Appendix 19: 11th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 11 **1 USD : Rp 8,400.00**

Total BW : **12.00 Box** **Price of BW/Box: 8.33 USD**

Month:	***Mar-00***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total Sales (I+II) (USD)**	**BW (USD)**	**Papzol (USD)**	**CaCo3 (USD)**	**Total Cost (USD)**	**Total Revenue (USD)**
	(Ha)	**(Box)**	**Co (Kg)**	**Price/kg (USD)**	**Total I (USD)**	**Co (Kg)**	**Price/kg (USD)**	**Total II (USD)**						
1039	0.50	0.25	6.00	2.32	13.93	1.00	0.12	0.12	14.05	2.08	0.12	0.03	2.23	**11.82**
2029	0.50	0.25	5.00	2.32	11.61	3.00	0.12	0.36	11.96	2.08	0.12	0.03	2.23	**9.73**
2030	0.50	0.25	5.00	2.32	11.61	1.00	0.12	0.12	11.73	2.08	0.12	0.03	2.23	**9.49**
2031	0.50	0.25	6.00	2.32	13.93	2.00	0.12	0.24	14.17	2.08	0.12	0.03	2.23	**11.93**
2032	0.50	0.25	5.00	2.32	11.61	0.00	0.12	0.00	11.61	2.08	0.12	0.03	2.23	**9.38**
2033	0.50	0.25	6.00	2.32	13.93	1.00	0.12	0.12	14.05	2.08	0.12	0.03	2.23	**11.82**
2035	0.50	0.25	7.00	1.67	11.67	8.00	0.12	0.95	12.62	2.08	0.12	0.03	2.23	**10.39**
4018	0.50	1.00	24.00	1.67	40.00	1.00	0.12	0.12	40.12	8.33	0.48	0.12	8.93	**31.19**
4019	0.50	1.00	26.00	2.32	60.36	1.00	0.12	0.12	60.48	8.33	0.48	0.12	8.93	**51.55**
2027	0.50	0.50	9.00	2.08	18.75	1.00	0.12	0.12	18.87	4.17	0.24	0.06	4.46	**14.40**
4022	0.75	0.75	18.00	2.32	41.79	2.00	0.12	0.24	42.02	6.25	0.36	0.09	6.70	**35.33**
4012	0.75	0.75	15.00	1.67	25.00	3.00	0.12	0.36	25.36	6.25	0.36	0.09	6.70	**18.66**
4017	0.75	0.75	15.00	1.67	25.00	0.00	0.12	0.00	25.00	6.25	0.36	0.09	6.70	**18.30**
4003	1.00	0.50	15.00	1.67	25.00	2.00	0.12	0.24	25.24	4.17	0.24	0.06	4.46	**20.77**
4004	1.00	0.50	14.00	1.67	23.33	0.00	0.12	0.00	23.33	4.17	0.24	0.06	4.46	**18.87**
2021	1.00	0.50	15.00	1.67	25.00	2.00	0.12	0.24	25.24	4.17	0.24	0.06	4.46	**20.77**
2023	1.00	0.50	12.00	1.67	20.00	3.00	0.12	0.36	20.36	4.17	0.24	0.06	4.46	**15.89**
2051	1.00	0.50	13.00	1.67	21.67	2.00	0.12	0.24	21.90	4.17	0.24	0.06	4.46	**17.44**
1026	3.00	3.00	50.00	2.32	116.07	5.00	0.12	0.60	116.67	25.00	1.43	0.36	26.79	**89.88**
	15.25	**12.00**	**266.00**		**530.24**	**38.00**		**4.52**	**534.76**	**100.00**	**5.71**	**1.43**	**107.14**	**427.62**

BW : Baby worms ***Average price of fresh cocoons /kg*** **2.00 USD** -

Co : Cocoons ***Average productions of fresh cocoons /box*** **22.17 Kg**

	Average	
	Cocoons/box (Kg)	**Price of cocoons/kg (USD)**
Larger size of farm	21.64	1.78
Middle size of farm	22.62	2.10
Small size of farm	0.00	-

Appendix 20: 12th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 12 **1 USD : Rp 8,400.00**

Total BW : **24.50 Box** **Price of BW/Box: 8.33 USD**

Month:	*Apr-00*		Sales							Cost				
ID	Land (Ha)	BW (Box)	fresh cocoons (good quality) Co (Kg)	Price/kg (USD)	Total I (USD)	poor quality Co (Kg)	Price/kg (USD)	Total II (USD)	Total Sales (I+II) (USD)	BW (USD)	Papzol (USD)	CaCo3 (USD)	Total Cost (USD)	Total Revenue (USD)
3009	0.30	0.50	12.00	2.08	25.00	0.00	0.12	0.00	25.00	4.17	0.24	0.06	4.46	**20.54**
3003	0.30	0.25	5.00	2.32	11.61	0.00	0.12	0.00	11.61	2.08	0.12	0.03	2.23	**9.38**
3004	0.30	0.25	6.50	2.08	13.54	0.50	0.12	0.06	13.60	2.08	0.12	0.03	2.23	**11.37**
3002	0.50	0.50	11.00	2.08	22.92	1.00	0.12	0.12	23.04	4.17	0.24	0.06	4.46	**18.57**
3005	0.50	0.25	6.00	2.32	13.93	0.00	0.12	0.00	13.93	2.08	0.12	0.03	2.23	**11.70**
3006	0.50	0.25	6.00	1.67	10.00	2.00	0.12	0.24	10.24	2.08	0.12	0.03	2.23	**8.01**
3007	0.50	0.25	4.00	1.67	6.67	0.50	0.12	0.06	6.73	2.08	0.12	0.03	2.23	**4.49**
3008	0.50	0.25	5.00	1.67	8.33	0.00	0.12	0.00	8.33	2.08	0.12	0.03	2.23	**6.10**
1012	0.50	0.25	4.00	2.08	8.33	0.00	0.12	0.00	8.33	2.08	0.12	0.03	2.23	**6.10**
1013	0.50	0.25	5.00	2.32	11.61	2.50	0.12	0.30	11.90	2.08	0.12	0.03	2.23	**9.67**
1014	0.50	0.25	5.00	2.08	10.42	0.50	0.12	0.06	10.48	2.08	0.12	0.03	2.23	**8.24**
1016	0.50	0.25	6.00	2.32	13.93	0.00	0.12	0.00	13.93	2.08	0.12	0.03	2.23	**11.70**
1019	0.50	0.25	5.00	2.32	11.61	0.50	0.12	0.06	11.67	2.08	0.12	0.03	2.23	**9.43**
1028	0.50	0.25	6.00	2.08	12.50	4.00	0.12	0.48	12.98	2.08	0.12	0.03	2.23	**10.74**
2054	0.50	0.25	5.00	1.67	8.33	0.00	0.12	0.00	8.33	2.08	0.12	0.03	2.23	**6.10**
2055	0.50	0.25	6.00	2.08	12.50	2.00	0.12	0.24	12.74	2.08	0.12	0.03	2.23	**10.51**
2060	0.50	0.25	5.00	2.08	10.42	1.00	0.12	0.12	10.54	2.08	0.12	0.03	2.23	**8.30**
2061	0.50	0.50	14.00	2.08	29.17	0.50	0.12	0.06	29.23	4.17	0.24	0.06	4.46	**24.76**
2062	0.50	0.25	5.00	2.08	10.42	0.00	0.12	0.00	10.42	2.08	0.12	0.03	2.23	**8.18**
2063	0.50	0.25	6.00	2.08	12.50	1.00	0.12	0.12	12.62	2.08	0.12	0.03	2.23	**10.39**
2006	0.50	0.50	12.00	2.08	25.00	1.50	0.12	0.18	25.18	4.17	0.24	0.06	4.46	**20.71**
2017	0.50	0.50	14.00	2.08	29.17	1.00	0.12	0.12	29.29	4.17	0.24	0.06	4.46	**24.82**
2019	0.50	0.50	12.00	2.08	25.00	0.00	0.12	0.00	25.00	4.17	0.24	0.06	4.46	**20.54**
1039	0.50	0.50	16.00	2.08	33.33	1.00	0.12	0.12	33.45	4.17	0.24	0.06	4.46	**28.99**
2024	0.50	0.50	15.00	2.08	31.25	1.00	0.12	0.12	31.37	4.17	0.24	0.06	4.46	**26.90**
2025	0.50	0.50	15.00	2.08	31.25	0.00	0.12	0.00	31.25	4.17	0.24	0.06	4.46	**26.79**
2026	0.50	0.25	5.00	2.08	10.42	1.00	0.12	0.12	10.54	2.08	0.12	0.03	2.23	**8.30**

Appendix 20: 12th Yield fresh cocoons (continue)

2027	0.50	0.25	6.00	2.08	12.50	1.00	0.12	0.12	12.62	2.08	0.12	0.03	2.23	**10.39**
2028	0.50	0.25	5.00	2.08	10.42	0.00	0.12	0.00	10.42	2.08	0.12	0.03	2.23	**8.18**
4022	0.50	0.25	5.00	1.67	8.33	5.00	0.12	0.60	8.93	2.08	0.12	0.03	2.23	**6.70**
2029	0.50	0.50	9.00	2.08	18.75	0.00	0.12	0.00	18.75	4.17	0.24	0.06	4.46	**14.29**
2030	0.50	0.50	12.00	2.32	27.86	1.00	0.12	0.12	27.98	4.17	0.24	0.06	4.46	**23.51**
2031	0.50	0.50	14.00	2.32	32.50	0.00	0.12	0.00	32.50	4.17	0.24	0.06	4.46	**28.04**
2032	0.50	0.50	15.00	1.67	25.00	0.00	0.12	0.00	25.00	4.17	0.24	0.06	4.46	**20.54**
3007	0.50	0.50	14.00	2.08	29.17	0.00	0.12	0.00	29.17	4.17	0.24	0.06	4.46	**24.70**
3002	0.50	0.50	14.00	2.32	32.50	0.00	0.12	0.00	32.50	4.17	0.24	0.06	4.46	**28.04**
3005	0.50	0.50	10.00	2.32	23.21	0.00	0.12	0.00	23.21	4.17	0.24	0.06	4.46	**18.75**
3006	0.50	0.50	14.00	2.32	32.50	0.00	0.12	0.00	32.50	4.17	0.24	0.06	4.46	**28.04**
3007	0.50	0.50	12.00	2.32	27.86	0.00	0.12	0.00	27.86	4.17	0.24	0.06	4.46	**23.39**
3008	0.50	0.50	11.00	2.32	25.54	2.00	0.12	0.24	25.77	4.17	0.24	0.06	4.46	**21.31**
4009	1.00	0.25	6.00	2.08	12.50	0.00	0.12	0.00	12.50	2.08	0.12	0.03	2.23	**10.27**
4005	1.00	0.25	5.00	2.32	11.61	1.00	0.12	0.12	11.73	2.08	0.12	0.03	2.23	**9.49**
4006	1.00	0.25	5.00	2.08	10.42	1.00	0.12	0.12	10.54	2.08	0.12	0.03	2.23	**8.30**
4009	1.00	0.50	12.00	2.32	27.86	0.00	0.12	0.00	27.86	4.17	0.24	0.06	4.46	**23.39**
4010	1.00	0.50	14.00	2.32	32.50	0.00	0.12	0.00	32.50	4.17	0.24	0.06	4.46	**28.04**
4013	1.00	0.50	15.00	2.32	34.82	1.00	0.12	0.12	34.94	4.17	0.24	0.06	4.46	**30.48**
4014	1.00	0.50	14.00	2.08	29.17	1.00	0.12	0.12	29.29	4.17	0.24	0.06	4.46	**24.82**
2010	1.00	0.50	13.00	2.32	30.18	0.00	0.12	0.00	30.18	4.17	0.24	0.06	4.46	**25.71**
2037	1.00	0.50	12.00	2.08	25.00	0.00	0.12	0.00	25.00	4.17	0.24	0.06	4.46	**20.54**
2051	1.00	0.50	11.00	2.08	22.92	0.00	0.12	0.00	22.92	4.17	0.24	0.06	4.46	**18.45**
3001	1.00	0.50	15.00	2.08	31.25	0.00	0.12	0.00	31.25	4.17	0.24	0.06	4.46	**26.79**
4003	1.00	0.50	10.00	2.32	23.21	1.00	0.12	0.12	23.33	4.17	0.24	0.06	4.46	**18.87**
4002	1.00	0.50	12.50	2.08	26.04	0.00	0.12	0.00	26.04	4.17	0.24	0.06	4.46	**21.58**
4004	1.00	0.50	14.00	2.32	32.50	0.00	0.12	0.00	32.50	4.17	0.24	0.06	4.46	**28.04**
2057	1.50	0.50	11.00	2.32	25.54	1.00	0.12	0.12	25.65	4.17	0.24	0.06	4.46	**21.19**
1026	3.00	2.00	29.00	2.08	60.42	2.00	0.12	0.24	60.65	16.67	0.95	0.24	17.86	**42.80**
5001	3.00	1.00	30.00	2.08	62.50	2.00	0.12	0.24	62.74	8.33	0.48	0.12	8.93	**53.81**
Total	**40.90**	**24.50**	**586.00**		**1,253.69**	**40.50**		**4.82**	**1,258.51**	**204.17**	**11.67**	**2.92**	**218.75**	**1,039.76**

BW : **Baby worms** ***Average price of fresh cocoons /kg*** **2.12 USD** -

Co : **Cocoons** ***Average productions of fresh cocoons /box*** **23.92 Kg**

	Average	
	Cocoons/box (Kg)	**Price of cocoons/kg (USD)**
Larger size of farm	23.44	2.20
Middle size of farm	24.29	2.09
Small size of farm	23.50	2.16

Appendix 21: 13th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 13 **1 USD : Rp 8,400.00**

Total BW : **46.00 Box** **Price of BW/Box: 8.33 USD**

Month:	***May-00***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total Sales (I+II)**				**Total Cost**	**Total Revenue**
	(Ha)	**(Box)**	**Co (Kg)**	**Price/kg (USD)**	**Total I (USD)**	**Co (Kg)**	**Price/kg (USD)**	**Total II (USD)**	**(USD)**	**BW (USD)**	**Papzol (USD)**	**CaCo3 (USD)**	**(USD)**	**(USD)**
1027	0.25	0.25	5.00	2.08	10.42	2.00	0.12	0.24	10.65	2.08	0.12	0.03	2.23	**8.42**
1049	0.25	0.25	6.00	2.08	12.50	1.00	0.12	0.12	12.62	2.08	0.12	0.03	2.23	**10.39**
3004	0.30	0.25	6.00	2.32	13.93	2.00	0.12	0.24	14.17	2.08	0.12	0.03	2.23	**11.93**
3003	0.30	0.25	6.00	2.32	13.93	0.00	0.12	0.00	13.93	2.08	0.12	0.03	2.23	**11.70**
2004	0.30	0.50	12.00	2.32	27.86	2.00	0.12	0.24	28.10	4.17	0.24	0.06	4.46	**23.63**
2008	0.30	0.50	11.00	2.32	25.54	1.00	0.12	0.12	25.65	4.17	0.24	0.06	4.46	**21.19**
2009	0.30	0.25	5.00	2.08	10.42	1.00	0.12	0.12	10.54	2.08	0.12	0.03	2.23	**8.30**
2034	0.30	0.25	6.00	2.08	12.50	0.50	0.12	0.06	12.56	2.08	0.12	0.03	2.23	**10.33**
1009	0.30	0.25	5.00	2.08	10.42	1.00	0.12	0.12	10.54	2.08	0.12	0.03	2.23	**8.30**
1020	0.30	0.25	6.00	2.08	12.50	1.00	0.12	0.12	12.62	2.08	0.12	0.03	2.23	**10.39**
2007	0.35	0.25	8.00	2.08	16.67	0.00	0.12	0.00	16.67	2.08	0.12	0.03	2.23	**14.43**
3006	0.50	0.25	6.50	2.08	13.54	0.00	0.12	0.00	13.54	2.08	0.12	0.03	2.23	**11.31**
1030	0.50	0.25	6.00	2.32	13.93	0.50	0.12	0.06	13.99	2.08	0.12	0.03	2.23	**11.76**
1039	0.50	0.25	6.00	2.08	12.50	2.00	0.12	0.24	12.74	2.08	0.12	0.03	2.23	**10.51**
2063	0.50	0.25	6.50	2.32	15.09	0.00	0.12	0.00	15.09	2.08	0.12	0.03	2.23	**12.86**
2006	0.50	0.50	12.00	2.32	27.86	1.00	0.12	0.12	27.98	4.17	0.24	0.06	4.46	**23.51**
1047	0.50	0.50	4.00	1.67	6.67	8.00	0.12	0.95	7.62	4.17	0.24	0.06	4.46	**3.15**
2047	0.50	0.50	10.00	2.08	20.83	2.00	0.12	0.24	21.07	4.17	0.24	0.06	4.46	**16.61**
2020	0.50	0.50	6.00	2.08	12.50	3.00	0.12	0.36	12.86	4.17	0.24	0.06	4.46	**8.39**
2024	0.50	0.50	7.00	2.32	16.25	2.00	0.12	0.24	16.49	4.17	0.24	0.06	4.46	**12.02**
2025	0.50	0.50	9.00	2.08	18.75	1.00	0.12	0.12	18.87	4.17	0.24	0.06	4.46	**14.40**
2026	0.50	0.50	12.00	2.32	27.86	1.00	0.12	0.12	27.98	4.17	0.24	0.06	4.46	**23.51**
2017	0.50	0.50	12.00	2.08	25.00	2.00	0.12	0.24	25.24	4.17	0.24	0.06	4.46	**20.77**
2027	0.50	0.50	12.50	2.32	29.02	1.00	0.12	0.12	29.14	4.17	0.24	0.06	4.46	**24.67**
2048	0.50	0.50	15.00	2.32	34.82	1.00	0.12	0.12	34.94	4.17	0.24	0.06	4.46	**30.48**
4016	0.50	0.50	10.00	2.08	20.83	2.00	0.12	0.24	21.07	4.17	0.24	0.06	4.46	**16.61**
4024	0.50	0.50	13.00	2.32	30.18	2.00	0.12	0.24	30.42	4.17	0.24	0.06	4.46	**25.95**
4013	0.50	0.50	14.00	2.08	29.17	0.50	0.12	0.06	29.23	4.17	0.24	0.06	4.46	**24.76**
2055	0.50	0.50	16.00	2.32	37.14	1.00	0.12	0.12	37.26	4.17	0.24	0.06	4.46	**32.80**
2053	0.50	0.50	14.00	2.32	32.50	2.00	0.12	0.24	32.74	4.17	0.24	0.06	4.46	**28.27**
2052	0.50	0.50	12.50	2.08	26.04	0.50	0.12	0.06	26.10	4.17	0.24	0.06	4.46	**21.64**
2039	0.50	0.50	10.00	2.32	23.21	1.00	0.12	0.12	23.33	4.17	0.24	0.06	4.46	**18.87**
2040	0.50	0.50	11.00	2.32	25.54	2.00	0.12	0.24	25.77	4.17	0.24	0.06	4.46	**21.31**
2041	0.50	0.50	13.00	2.08	27.08	1.00	0.12	0.12	27.20	4.17	0.24	0.06	4.46	**22.74**
2043	0.50	0.50	15.00	2.08	31.25	1.00	0.12	0.12	31.37	4.17	0.24	0.06	4.46	**26.90**
2044	0.50	0.50	8.00	2.08	16.67	0.00	0.12	0.00	16.67	4.17	0.24	0.06	4.46	**12.20**
2045	0.50	0.50	5.00	2.08	10.42	1.00	0.12	0.12	10.54	4.17	0.24	0.06	4.46	**6.07**
2046	0.50	0.50	10.00	2.08	20.83	2.00	0.12	0.24	21.07	4.17	0.24	0.06	4.46	**16.61**
4011	0.50	0.75	15.00	2.08	31.25	2.00	0.12	0.24	31.49	6.25	0.36	0.09	6.70	**24.79**
4012	0.50	0.75	17.00	0.00	0.00	1.00	0.12	0.12	0.12	6.25	0.36	0.09	6.70	**-6.57**
4015	0.50	0.50	7.00	2.32	16.25	1.50	0.12	0.18	16.43	4.17	0.24	0.06	4.46	**11.96**
4018	0.50	0.50	2.00	1.67	3.33	1.00	0.12	0.12	3.45	4.17	0.24	0.06	4.46	**-1.01**

Appendix 21: 13th Yield fresh cocoons (continue)

4019	0.50	0.50	11.00	2.08	22.92	2.00	0.12	0.24	23.15	4.17	0.24	0.06	4.46	**18.69**
4017	0.50	0.50	6.00	1.67	10.00	3.00	0.12	0.36	10.36	4.17	0.24	0.06	4.46	**5.89**
4007	0.75	0.50	13.00	2.32	30.18	0.00	0.12	0.00	30.18	4.17	0.24	0.06	4.46	**25.71**
2010	1.00	0.50	10.00	2.32	23.21	2.00	0.12	0.24	23.45	4.17	0.24	0.06	4.46	**18.99**
2011	1.00	0.50	12.00	2.08	25.00	2.00	0.12	0.24	25.24	4.17	0.24	0.06	4.46	**20.77**
2012	1.00	0.50	15.00	2.08	31.25	1.00	0.12	0.12	31.37	4.17	0.24	0.06	4.46	**26.90**
2018	1.00	0.50	12.00	2.32	27.86	1.00	0.12	0.12	27.98	4.17	0.24	0.06	4.46	**23.51**
2021	1.00	0.50	10.00	2.08	20.83	1.00	0.12	0.12	20.95	4.17	0.24	0.06	4.46	**16.49**
2023	1.00	0.50	12.00	2.08	25.00	2.00	0.12	0.24	25.24	4.17	0.24	0.06	4.46	**20.77**
2037	1.00	0.50	15.00	2.08	31.25	1.50	0.12	0.18	31.43	4.17	0.24	0.06	4.46	**26.96**
2051	1.00	0.50	13.00	2.08	27.08	1.00	0.12	0.12	27.20	4.17	0.24	0.06	4.46	**22.74**
3001	1.00	0.50	12.00	2.08	25.00	0.50	0.12	0.06	25.06	4.17	0.24	0.06	4.46	**20.60**
3010	1.00	0.50	8.00	2.08	16.67	4.00	0.12	0.48	17.14	4.17	0.24	0.06	4.46	**12.68**
4001	1.00	0.75	17.50	2.08	36.46	1.00	0.12	0.12	36.58	6.25	0.36	0.09	6.70	**29.88**
4002	1.00	0.75	16.00	2.32	37.14	3.00	0.12	0.36	37.50	6.25	0.36	0.09	6.70	**30.80**
4003	1.00	0.50	12.00	2.32	27.86	1.00	0.12	0.12	27.98	4.17	0.24	0.06	4.46	**23.51**
4004	1.00	0.50	13.00	2.32	30.18	1.00	0.12	0.12	30.30	4.17	0.24	0.06	4.46	**25.83**
4005	1.00	0.50	9.00	1.67	15.00	1.00	0.12	0.12	15.12	4.17	0.24	0.06	4.46	**10.65**
4006	1.00	1.00	23.00	2.08	47.92	1.50	0.12	0.18	48.10	8.33	0.48	0.12	8.93	**39.17**
1010	1.00	0.75	20.00	2.32	46.43	2.00	0.12	0.24	46.67	6.25	0.36	0.09	6.70	**39.97**
1011	1.00	0.75	21.00	2.08	43.75	0.50	0.12	0.06	43.81	6.25	0.36	0.09	6.70	**37.11**
1015	1.00	0.75	19.00	2.32	44.11	1.00	0.12	0.12	44.23	6.25	0.36	0.09	6.70	**37.53**
1022	1.00	0.75	18.00	2.32	41.79	0.50	0.12	0.06	41.85	6.25	0.36	0.09	6.70	**35.15**
1023	1.00	0.75	19.00	2.08	39.58	2.00	0.12	0.24	39.82	6.25	0.36	0.09	6.70	**33.13**
1024	1.00	0.75	15.00	2.32	34.82	1.00	0.12	0.12	34.94	6.25	0.36	0.09	6.70	**28.24**
1025	1.00	0.75	17.00	2.32	39.46	0.50	0.12	0.06	39.52	6.25	0.36	0.09	6.70	**32.83**
1047	1.00	0.75	16.00	2.32	37.14	1.00	0.12	0.12	37.26	6.25	0.36	0.09	6.70	**30.57**
3021	1.00	1.00	21.00	2.32	48.75	2.00	0.12	0.24	48.99	8.33	0.48	0.12	8.93	**40.06**
4024	1.00	0.75	13.00	2.08	27.08	2.00	0.12	0.24	27.32	6.25	0.36	0.09	6.70	**20.63**
4008	1.50	0.75	12.00	2.08	25.00	2.00	0.12	0.24	25.24	6.25	0.36	0.09	6.70	**18.54**
4008	1.50	1.00	19.00	2.08	39.58	0.00	0.12	0.00	39.58	8.33	0.48	0.12	8.93	**30.65**
4020	1.50	1.00	22.00	2.08	45.83	0.00	0.12	0.00	45.83	8.33	0.48	0.12	8.93	**36.90**
1021	2.00	1.00	16.00	2.08	33.33	1.50	0.12	0.18	33.51	8.33	0.48	0.12	8.93	**24.58**
3011	3.00	0.75	15.00	2.08	31.25	1.00	0.12	0.12	31.37	6.25	0.36	0.09	6.70	**24.67**
1026	3.00	3.00	45.00	2.08	93.75	5.00	0.12	0.60	94.35	25.00	1.43	0.36	26.79	**67.56**
5001	3.00	2.00	30.00	2.08	62.50	1.50	0.12	0.18	62.68	16.67	0.95	0.24	17.86	**44.82**
Total	**62.00**	**46.00**	**970.50**		**2,067.95**	**110.50**		**13.15**	**2,081.11**	**383.33**	**21.90**	**5.48**	**410.71**	**1,670.39**

BW : Baby worms — ***Average price of fresh cocoons /kg*** — **2.13 USD**

Co : Cocoons — ***Average productions of fresh cocoons /box*** — **21.10 Kg**

	Average	
	Cocoons/box (Kg)	Price of cocoons/kg (USD)
Larger size of farm	20.86	2.16
Middle size of farm	21.03	2.08
Small size of farm	23.38	2.17

Appendix 22: 14th Yield fresh cocoons

Banyumas Sutera Alam
Harvest season 14 **1 USD : Rp 8,400.00**
Total BW : **50.00 Box** **Price of BW/Box: 8.33 USD**

Month:	***Jun-00***		**Sales**							**Cost**				
ID	**Land (Ha)**	**BW (Box)**	**fresh cocoons (good quality)**			**poor quality**			**Total Sales (I+II) (USD)**	**BW (USD)**	**Papzol (USD)**	**CaCo3 (USD)**	**Total Cost (USD)**	**Total Revenue (USD)**
			Co (Kg)	**Price/kg (USD)**	**Total I (USD)**	**Co (Kg)**	**Price/kg (USD)**	**Total II (USD)**						
2042	0.30	0.25	6.00	2.32	13.93	0.50	0.12	0.06	13.99	2.08	0.12	0.03	2.23	**11.76**
3009	0.30	0.25	4.00	2.32	9.29	2.00	0.12	0.24	9.52	2.08	0.12	0.03	2.23	**7.29**
3004	0.30	0.50	11.00	2.32	25.54	1.00	0.12	0.12	25.65	4.17	0.24	0.06	4.46	**21.19**
3003	0.30	0.50	13.00	2.32	30.18	2.00	0.12	0.24	30.42	4.17	0.24	0.06	4.46	**25.95**
2034	0.30	0.25	5.00	2.32	11.61	3.00	0.12	0.36	11.96	2.08	0.12	0.03	2.23	**9.73**
2099	0.30	0.25	4.00	1.67	6.67	1.00	0.12	0.12	6.79	2.08	0.12	0.03	2.23	**4.55**
2008	0.30	0.25	5.50	1.67	9.17	1.00	0.12	0.12	9.29	2.08	0.12	0.03	2.23	**7.05**
2004	0.30	0.25	4.00	1.67	6.67	2.00	0.12	0.24	6.90	2.08	0.12	0.03	2.23	**4.67**
2038	0.35	0.25	5.00	2.32	11.61	1.00	0.12	0.12	11.73	2.08	0.12	0.03	2.23	**9.49**
2007	0.35	0.25	2.00	1.67	3.33	5.00	0.12	0.60	3.93	2.08	0.12	0.03	2.23	**1.70**
2001	0.40	0.25	3.00	1.67	5.00	3.00	0.12	0.36	5.36	2.08	0.12	0.03	2.23	**3.13**
2049	0.45	0.25	4.00	2.08	8.33	2.00	0.12	0.24	8.57	2.08	0.12	0.03	2.23	**6.34**
1047	0.50	0.50	10.00	2.08	20.83	2.00	0.12	0.24	21.07	4.17	0.24	0.06	4.46	**16.61**
1012	0.50	0.50	12.00	2.32	27.86	3.00	0.12	0.36	28.21	4.17	0.24	0.06	4.46	**23.75**
1013	0.50	0.50	13.00	2.08	27.08	2.00	0.12	0.24	27.32	4.17	0.24	0.06	4.46	**22.86**
1014	0.50	0.50	10.00	2.32	23.21	2.00	0.12	0.24	23.45	4.17	0.24	0.06	4.46	**18.99**
1016	0.50	0.50	11.00	2.32	25.54	1.00	0.12	0.12	25.65	4.17	0.24	0.06	4.46	**21.19**
1019	0.50	0.50	12.00	2.08	25.00	2.00	0.12	0.24	25.24	4.17	0.24	0.06	4.46	**20.77**
2028	0.50	0.50	5.50	2.32	12.77	1.00	0.12	0.12	12.89	4.17	0.24	0.06	4.46	**8.42**
2029	0.50	0.50	4.50	2.08	9.38	2.00	0.12	0.24	9.61	4.17	0.24	0.06	4.46	**5.15**
2030	0.50	0.50	5.00	2.08	10.42	2.50	0.12	0.30	10.71	4.17	0.24	0.06	4.46	**6.25**
2031	0.50	0.50	8.00	2.08	16.67	1.00	0.12	0.12	16.79	4.17	0.24	0.06	4.46	**12.32**
2032	0.50	0.50	6.00	2.08	12.50	2.00	0.12	0.24	12.74	4.17	0.24	0.06	4.46	**8.27**
2033	0.50	0.50	7.00	2.08	14.58	1.00	0.12	0.12	14.70	4.17	0.24	0.06	4.46	**10.24**
2035	0.50	0.50	3.50	1.67	5.83	6.00	0.12	0.71	6.55	4.17	0.24	0.06	4.46	**2.08**
4018	0.50	0.50	9.00	2.08	18.75	1.00	0.12	0.12	18.87	4.17	0.24	0.06	4.46	**14.40**
4019	0.50	0.50	8.00	1.67	13.33	0.00	0.12	0.00	13.33	4.17	0.24	0.06	4.46	**8.87**
2063	0.50	0.50	6.00	2.08	12.50	2.50	0.12	0.30	12.80	4.17	0.24	0.06	4.46	**8.33**
1039	0.50	0.50	7.50	1.67	12.50	0.00	0.12	0.00	12.50	4.17	0.24	0.06	4.46	**8.04**
2046	0.50	0.25	5.50	2.32	12.77	1.00	0.12	0.12	12.89	2.08	0.12	0.03	2.23	**10.65**
2019	0.50	0.50	12.00	2.32	27.86	2.00	0.12	0.24	28.10	4.17	0.24	0.06	4.46	**23.63**
2020	0.50	0.25	3.00	2.32	6.96	4.00	0.12	0.48	7.44	2.08	0.12	0.03	2.23	**5.21**
2024	0.50	0.25	3.00	2.32	6.96	1.00	0.12	0.12	7.08	2.08	0.12	0.03	2.23	**4.85**
2025	0.50	0.50	12.50	2.32	29.02	1.50	0.12	0.18	29.20	4.17	0.24	0.06	4.46	**24.73**
2026	0.50	0.25	5.00	2.32	11.61	1.00	0.12	0.12	11.73	2.08	0.12	0.03	2.23	**9.49**
1030	0.50	0.25	3.00	1.67	5.00	1.00	0.12	0.12	5.12	2.08	0.12	0.03	2.23	**2.89**
2027	0.50	0.25	5.00	2.08	10.42	3.00	0.12	0.36	10.77	2.08	0.12	0.03	2.23	**8.54**

Appendix 22: 14th Yield fresh cocoons (continue)

2028	0.50	0.25	4.00	2.08	8.33	0.50	0.12	0.06	8.39	2.08	0.12	0.03	2.23	**6.16**
2029	0.50	0.25	4.00	2.08	8.33	2.00	0.12	0.24	8.57	2.08	0.12	0.03	2.23	**6.34**
2030	0.50	0.50	13.00	1.67	21.67	1.00	0.12	0.12	21.79	4.17	0.24	0.06	4.46	**17.32**
2031	0.50	0.50	12.00	1.67	20.00	2.00	0.12	0.24	20.24	4.17	0.24	0.06	4.46	**15.77**
2032	0.50	0.50	12.00	1.67	20.00	1.00	0.12	0.12	20.12	4.17	0.24	0.06	4.46	**15.65**
2033	0.50	0.50	11.00	1.67	18.33	1.00	0.12	0.12	18.45	4.17	0.24	0.06	4.46	**13.99**
2035	0.50	0.50	13.00	1.67	21.67	1.00	0.12	0.12	21.79	4.17	0.24	0.06	4.46	**17.32**
2039	0.50	0.25	5.00	1.67	8.33	1.00	0.12	0.12	8.45	2.08	0.12	0.03	2.23	**6.22**
2040	0.50	0.25	4.50	1.67	7.50	1.00	0.12	0.12	7.62	2.08	0.12	0.03	2.23	**5.39**
2041	0.50	0.25	6.00	1.67	10.00	1.00	0.12	0.12	10.12	2.08	0.12	0.03	2.23	**7.89**
2043	0.50	0.25	5.00	2.08	10.42	1.00	0.12	0.12	10.54	2.08	0.12	0.03	2.23	**8.30**
2044	0.50	0.25	7.00	2.32	16.25	0.50	0.12	0.06	16.31	2.08	0.12	0.03	2.23	**14.08**
2045	0.50	0.25	6.00	2.08	12.50	1.00	0.12	0.12	12.62	2.08	0.12	0.03	2.23	**10.39**
2047	0.50	0.25	6.50	2.32	15.09	2.00	0.12	0.24	15.33	2.08	0.12	0.03	2.23	**13.10**
2048	0.50	0.25	4.00	2.08	8.33	0.50	0.12	0.06	8.39	2.08	0.12	0.03	2.23	**6.16**
2050	0.50	0.25	3.00	1.67	5.00	2.00	0.12	0.24	5.24	2.08	0.12	0.03	2.23	**3.01**
2052	0.50	0.25	6.00	2.08	12.50	0.50	0.12	0.06	12.56	2.08	0.12	0.03	2.23	**10.33**
2053	0.50	0.25	3.00	1.67	5.00	3.00	0.12	0.36	5.36	2.08	0.12	0.03	2.23	**3.13**
3002	0.50	0.25	3.25	1.67	5.42	4.00	0.12	0.48	5.89	2.08	0.12	0.03	2.23	**3.66**
3005	0.50	0.25	2.50	1.67	4.17	3.00	0.12	0.36	4.52	2.08	0.12	0.03	2.23	**2.29**
3006	0.50	0.25	5.00	2.08	10.42	1.00	0.12	0.12	10.54	2.08	0.12	0.03	2.23	**8.30**
3007	0.50	0.25	5.50	2.32	12.77	0.50	0.12	0.06	12.83	2.08	0.12	0.03	2.23	**10.60**
3008	0.50	0.25	6.00	2.08	12.50	0.00	0.12	0.00	12.50	2.08	0.12	0.03	2.23	**10.27**
4011	0.50	0.25	5.00	2.08	10.42	1.00	0.12	0.12	10.54	2.08	0.12	0.03	2.23	**8.30**
4012	0.50	0.25	4.00	1.67	6.67	3.00	0.12	0.36	7.02	2.08	0.12	0.03	2.23	**4.79**
4015	0.50	0.25	4.00	1.67	6.67	2.00	0.12	0.24	6.90	2.08	0.12	0.03	2.23	**4.67**
4017	0.50	0.25	3.00	1.67	5.00	3.00	0.12	0.36	5.36	2.08	0.12	0.03	2.23	**3.13**
4018	0.50	0.25	5.00	2.32	11.61	1.00	0.12	0.12	11.73	2.08	0.12	0.03	2.23	**9.49**
4019	0.50	0.25	5.00	2.08	10.42	1.00	0.12	0.12	10.54	2.08	0.12	0.03	2.23	**8.30**
7005	0.50	0.50	12.00	2.32	27.86	1.50	0.12	0.18	28.04	4.17	0.24	0.06	4.46	**23.57**
7006	0.50	0.50	10.00	2.32	23.21	3.00	0.12	0.36	23.57	4.17	0.24	0.06	4.46	**19.11**
4021	1.00	0.50	8.00	2.08	16.67	5.00	0.12	0.60	17.26	4.17	0.24	0.06	4.46	**12.80**
4023	1.00	0.50	9.00	2.32	20.89	2.00	0.12	0.24	21.13	4.17	0.24	0.06	4.46	**16.67**
5002	1.00	0.50	13.00	2.32	30.18	1.00	0.12	0.12	30.30	4.17	0.24	0.06	4.46	**25.83**
1001	1.00	0.50	12.00	2.08	25.00	0.00	0.12	0.00	25.00	4.17	0.24	0.06	4.46	**20.54**
1002	1.00	0.50	12.00	2.08	25.00	1.00	0.12	0.12	25.12	4.17	0.24	0.06	4.46	**20.65**
1003	1.00	0.50	9.00	2.32	20.89	1.00	0.12	0.12	21.01	4.17	0.24	0.06	4.46	**16.55**
1006	1.00	0.50	6.00	2.08	12.50	2.00	0.12	0.24	12.74	4.17	0.24	0.06	4.46	**8.27**
1007	1.00	0.50	12.00	2.32	27.86	1.00	0.12	0.12	27.98	4.17	0.24	0.06	4.46	**23.51**
1010	1.00	0.50	10.00	2.32	23.21	1.50	0.12	0.18	23.39	4.17	0.24	0.06	4.46	**18.93**
1011	1.00	0.50	12.50	2.32	29.02	2.00	0.12	0.24	29.26	4.17	0.24	0.06	4.46	**24.79**
1015	1.00	0.50	8.00	2.08	16.67	1.00	0.12	0.12	16.79	4.17	0.24	0.06	4.46	**12.32**
1022	1.00	0.50	8.00	2.08	16.67	2.00	0.12	0.24	16.90	4.17	0.24	0.06	4.46	**12.44**
1023	1.00	0.50	6.00	1.67	10.00	3.00	0.12	0.36	10.36	4.17	0.24	0.06	4.46	**5.89**
1024	1.00	0.50	6.00	1.67	10.00	1.00	0.12	0.12	10.12	4.17	0.24	0.06	4.46	**5.65**

Appendix 22: 14th Yield fresh cocoons (continue)

1025	1.00	0.50	8.00	2.32	18.57	0.50	0.12	0.06	18.63	4.17	0.24	0.06	4.46	**14.17**
1047	1.00	0.50	9.00	2.08	18.75	2.00	0.12	0.24	18.99	4.17	0.24	0.06	4.46	**14.52**
2010	1.00	0.50	12.00	2.32	27.86	1.00	0.12	0.12	27.98	4.17	0.24	0.06	4.46	**23.51**
2011	1.00	0.75	9.00	2.32	20.89	3.50	0.12	0.42	21.31	6.25	0.36	0.09	6.70	**14.61**
2012	1.00	0.75	15.00	1.67	25.00	2.00	0.12	0.24	25.24	6.25	0.36	0.09	6.70	**18.54**
2013	1.00	0.75	16.00	1.67	26.67	0.50	0.12	0.06	26.73	6.25	0.36	0.09	6.70	**20.03**
2014	1.00	0.50	12.00	2.32	27.86	1.00	0.12	0.12	27.98	4.17	0.24	0.06	4.46	**23.51**
2018	1.00	0.50	12.00	1.67	20.00	2.00	0.12	0.24	20.24	4.17	0.24	0.06	4.46	**15.77**
2021	1.00	0.50	9.00	1.67	15.00	3.00	0.12	0.36	15.36	4.17	0.24	0.06	4.46	**10.89**
2023	1.00	0.50	9.00	2.32	20.89	1.00	0.12	0.12	21.01	4.17	0.24	0.06	4.46	**16.55**
2037	1.00	0.50	8.00	2.32	18.57	3.00	0.12	0.36	18.93	4.17	0.24	0.06	4.46	**14.46**
2051	1.00	0.50	11.00	2.32	25.54	2.00	0.12	0.24	25.77	4.17	0.24	0.06	4.46	**21.31**
3001	1.00	0.50	10.00	2.08	20.83	1.00	0.12	0.12	20.95	4.17	0.24	0.06	4.46	**16.49**
3010	1.00	0.50	9.00	2.32	20.89	2.00	0.12	0.24	21.13	4.17	0.24	0.06	4.46	**16.67**
4001	1.00	0.50	11.00	2.32	25.54	1.00	0.12	0.12	25.65	4.17	0.24	0.06	4.46	**21.19**
4002	1.00	0.50	8.00	2.32	18.57	1.00	0.12	0.12	18.69	4.17	0.24	0.06	4.46	**14.23**
4003	1.00	0.50	5.00	2.08	10.42	2.00	0.12	0.24	10.65	4.17	0.24	0.06	4.46	**6.19**
4004	1.00	0.50	9.00	2.08	18.75	1.00	0.12	0.12	18.87	4.17	0.24	0.06	4.46	**14.40**
4005	1.00	0.50	10.00	2.08	20.83	1.00	0.12	0.12	20.95	4.17	0.24	0.06	4.46	**16.49**
4006	1.00	0.50	10.00	2.08	20.83	2.00	0.12	0.24	21.07	4.17	0.24	0.06	4.46	**16.61**
4009	1.00	0.50	11.00	2.08	22.92	0.00	0.12	0.00	22.92	4.17	0.24	0.06	4.46	**18.45**
4010	1.00	0.50	11.00	2.32	25.54	0.00	0.12	0.00	25.54	4.17	0.24	0.06	4.46	**21.07**
4013	1.00	0.50	15.00	2.32	34.82	1.50	0.12	0.18	35.00	4.17	0.24	0.06	4.46	**30.54**
4014	1.00	0.50	9.50	2.32	22.05	2.00	0.12	0.24	22.29	4.17	0.24	0.06	4.46	**17.83**
1018	1.25	0.50	5.00	1.67	8.33	5.00	0.12	0.60	8.93	4.17	0.24	0.06	4.46	**4.46**
4008	1.50	0.50	6.00	2.08	12.50	2.00	0.12	0.24	12.74	4.17	0.24	0.06	4.46	**8.27**
4020	1.50	0.25	6.00	2.08	12.50	0.00	0.12	0.00	12.50	2.08	0.12	0.03	2.23	**10.27**
1050	1.50	0.25	9.00	2.32	20.89	1.00	0.12	0.12	21.01	2.08	0.12	0.03	2.23	**18.78**
2057	1.50	0.25	6.00	2.32	13.93	2.00	0.12	0.24	14.17	2.08	0.12	0.03	2.23	**11.93**
1021	2.00	0.25	6.00	2.08	12.50	1.00	0.12	0.12	12.62	2.08	0.12	0.03	2.23	**10.39**
1026	3.00	3.00	45.00	2.32	104.46	5.00	0.12	0.60	105.06	25.00	1.43	0.36	26.79	**78.27**
5001	3.00	1.25	35.00	2.32	81.25	2.00	0.12	0.24	81.49	10.42	0.60	0.15	11.16	**70.33**
Total	**85.20**	**50.00**	**946.75**		**1,995.54**	**192.50**		**22.92**	**2,018.45**	**416.67**	**23.81**	**5.95**	**446.43**	**1,572.02**

BW : Baby worms — ***Average price of fresh cocoons /kg*** **2.06 USD**

Co : Cocoons — ***Average productions of fresh cocoons /box*** **18.94 Kg**

	Average	
	Cocoons/box (Kg)	Price of cocoons/kg (USD)
Larger size of farm	19.15	2.14
Middle size of farm	18.65	2.01
Small size of farm	19.00	2.03

Appendix 23: 15th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 15 **1 USD : Rp 8,400.00**

Total BW : **37.00 Box** **Price of BW/Box: 8.33 USD**

Month:	***Jul-00***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total Sales (I+II)**				**Total Cost**	**Total Revenue**
			Co	**Price/kg**	**Total I**	**Co**	**Price/kg**	**Total II**		**BW**	**Papzol**	**CaCo3**		
	(Ha)	**(Box)**	**(Kg)**	**(USD)**	**(USD)**	**(Kg)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**
3009	0.30	0.25	4.00	2.08	8.33	1.00	0.12	0.12	8.45	2.08	0.12	0.03	2.23	**6.22**
3003	0.30	0.25	5.00	2.32	11.61	1.00	0.12	0.12	11.73	2.08	0.12	0.03	2.23	**9.49**
3004	0.30	0.25	5.50	2.32	12.77	2.00	0.12	0.24	13.01	2.08	0.12	0.03	2.23	**10.77**
3002	0.50	0.25	5.00	2.32	11.61	1.00	0.12	0.12	11.73	2.08	0.12	0.03	2.23	**9.49**
3005	0.50	0.25	4.00	2.32	9.29	3.00	0.12	0.36	9.64	2.08	0.12	0.03	2.23	**7.41**
3006	0.50	0.25	5.00	2.32	11.61	2.00	0.12	0.24	11.85	2.08	0.12	0.03	2.23	**9.61**
3007	0.50	0.50	11.00	2.32	25.54	3.00	0.12	0.36	25.89	4.17	0.24	0.06	4.46	**21.43**
3008	0.50	0.50	11.00	2.32	25.54	2.00	0.12	0.24	25.77	4.17	0.24	0.06	4.46	**21.31**
1012	0.50	0.25	4.00	2.32	9.29	3.00	0.12	0.36	9.64	2.08	0.12	0.03	2.23	**7.41**
1013	0.50	0.25	3.00	2.08	6.25	3.00	0.12	0.36	6.61	2.08	0.12	0.03	2.23	**4.38**
1014	0.50	0.25	5.00	2.08	10.42	1.00	0.12	0.12	10.54	2.08	0.12	0.03	2.23	**8.30**
1016	0.50	0.25	4.00	2.32	9.29	2.00	0.12	0.24	9.52	2.08	0.12	0.03	2.23	**7.29**
1019	0.50	0.25	4.00	2.32	9.29	1.00	0.12	0.12	9.40	2.08	0.12	0.03	2.23	**7.17**
1028	0.50	0.25	5.00	2.32	11.61	1.00	0.12	0.12	11.73	2.08	0.12	0.03	2.23	**9.49**
2054	0.50	0.25	6.00	2.32	13.93	-	0.12	-	13.93	2.08	0.12	0.03	2.23	**11.70**
2055	0.50	0.25	5.00	2.08	10.42	1.00	0.12	0.12	10.54	2.08	0.12	0.03	2.23	**8.30**
2060	0.50	0.25	3.00	1.67	5.00	2.00	0.12	0.24	5.24	2.08	0.12	0.03	2.23	**3.01**
2061	0.50	0.25	5.00	2.08	10.42	1.00	0.12	0.12	10.54	2.08	0.12	0.03	2.23	**8.30**
2062	0.50	0.25	3.00	2.08	6.25	3.00	0.12	0.36	6.61	2.08	0.12	0.03	2.23	**4.38**
2063	0.50	0.25	5.00	2.08	10.42	2.00	0.12	0.24	10.65	2.08	0.12	0.03	2.23	**8.42**
2006	0.50	0.50	9.00	2.08	18.75	1.00	0.12	0.12	18.87	4.17	0.24	0.06	4.46	**14.40**
2017	0.50	0.25	4.00	2.08	8.33	2.00	0.12	0.24	8.57	2.08	0.12	0.03	2.23	**6.34**
2019	0.50	0.50	10.00	2.08	20.83	-	0.12	-	20.83	4.17	0.24	0.06	4.46	**16.37**
2020	0.50	0.50	9.00	2.08	18.75	2.00	0.12	0.24	18.99	4.17	0.24	0.06	4.46	**14.52**
2024	0.50	0.25	3.00	1.67	5.00	2.00	0.12	0.24	5.24	2.08	0.12	0.03	2.23	**3.01**
2025	0.50	0.50	11.00	2.08	22.92	1.00	0.12	0.12	23.04	4.17	0.24	0.06	4.46	**18.57**
2026	0.50	0.25	3.00	2.08	6.25	5.00	0.12	0.60	6.85	2.08	0.12	0.03	2.23	**4.61**
2027	0.50	0.25	6.00	2.08	12.50	0.50	0.12	0.06	12.56	2.08	0.12	0.03	2.23	**10.33**
2045	0.50	0.50	9.00	2.08	18.75	1.00	0.12	0.12	18.87	4.17	0.24	0.06	4.46	**14.40**
4022	0.50	0.50	9.00	1.67	15.00	3.00	0.12	0.36	15.36	4.17	0.24	0.06	4.46	**10.89**
1039	0.50	0.50	7.50	2.08	15.63	2.00	0.12	0.24	15.86	4.17	0.24	0.06	4.46	**11.40**
2039	0.50	0.50	8.00	2.08	16.67	1.00	0.12	0.12	16.79	4.17	0.24	0.06	4.46	**12.32**
2047	0.50	0.50	12.00	2.08	25.00	3.00	0.12	0.36	25.36	4.17	0.24	0.06	4.46	**20.89**
2050	0.50	0.50	12.00	1.67	20.00	2.00	0.12	0.24	20.24	4.17	0.24	0.06	4.46	**15.77**
3007	0.50	0.25	6.00	2.08	12.50	1.00	0.12	0.12	12.62	2.08	0.12	0.03	2.23	**10.39**
3002	0.50	0.25	2.00	1.67	3.33	3.00	0.12	0.36	3.69	2.08	0.12	0.03	2.23	**1.46**
3005	0.50	0.25	4.00	2.08	8.33	1.00	0.12	0.12	8.45	2.08	0.12	0.03	2.23	**6.22**

Appendix 23: 15th Yield fresh cocoons (continue)

3006	0.50	0.25	6.00	1.67	10.00	1.00	0.12	0.12	10.12	2.08	0.12	0.03	2.23	**7.89**
3007	0.50	0.75	7.50	2.08	15.63	4.00	0.12	0.48	16.10	6.25	0.36	0.09	6.70	**9.40**
3008	0.50	0.75	15.00	2.08	31.25	2.00	0.12	0.24	31.49	6.25	0.36	0.09	6.70	**24.79**
4011	0.50	0.75	7.50	2.08	15.63	5.00	0.12	0.60	16.22	6.25	0.36	0.09	6.70	**9.52**
4012	0.50	0.75	14.00	2.08	29.17	1.00	0.12	0.12	29.29	6.25	0.36	0.09	6.70	**22.59**
4013	0.50	0.50	12.00	2.08	25.00	3.00	0.12	0.36	25.36	4.17	0.24	0.06	4.46	**20.89**
4015	0.50	0.50	8.00	2.08	16.67	2.00	0.12	0.24	16.90	4.17	0.24	0.06	4.46	**12.44**
4017	0.50	0.50	9.00	2.32	20.89	1.00	0.12	0.12	21.01	4.17	0.24	0.06	4.46	**16.55**
4018	0.50	0.50	10.00	2.08	20.83	2.00	0.12	0.24	21.07	4.17	0.24	0.06	4.46	**16.61**
4019	0.50	0.50	11.00	2.08	22.92	3.00	0.12	0.36	23.27	4.17	0.24	0.06	4.46	**18.81**
4022	0.50	0.50	9.00	2.08	18.75	4.00	0.12	0.48	19.23	4.17	0.24	0.06	4.46	**14.76**
7005	0.50	0.75	5.00	2.08	10.42	5.00	0.12	0.60	11.01	6.25	0.36	0.09	6.70	**4.32**
7006	0.50	0.50	7.50	2.32	17.41	5.00	0.12	0.60	18.01	4.17	0.24	0.06	4.46	**13.54**
2005	0.55	0.50	5.00	2.32	11.61	5.00	0.12	0.60	12.20	4.17	0.24	0.06	4.46	**7.74**
1031	0.60	0.50	6.00	2.08	12.50	4.00	0.12	0.48	12.98	4.17	0.24	0.06	4.46	**8.51**
1005	0.75	0.75	3.00	1.67	5.00	8.00	0.12	0.95	5.95	6.25	0.36	0.09	6.70	**(0.74)**
4007	0.75	0.75	5.00	2.08	10.42	1.00	0.12	0.12	10.54	6.25	0.36	0.09	6.70	**3.84**
2051	1.00	0.75	15.00	2.08	31.25	2.00	0.12	0.24	31.49	6.25	0.36	0.09	6.70	**24.79**
2037	1.00	0.75	12.00	1.67	20.00	1.00	0.12	0.12	20.12	6.25	0.36	0.09	6.70	**13.42**
2023	1.00	0.75	10.00	1.67	16.67	5.00	0.12	0.60	17.26	6.25	0.36	0.09	6.70	**10.57**
4009	1.00	0.75	15.00	1.67	25.00	2.00	0.12	0.24	25.24	6.25	0.36	0.09	6.70	**18.54**
4005	1.00	0.75	12.00	1.67	20.00	2.00	0.12	0.24	20.24	6.25	0.36	0.09	6.70	**13.54**
4006	1.00	0.75	14.00	1.67	23.33	2.00	0.12	0.24	23.57	6.25	0.36	0.09	6.70	**16.88**
4009	1.00	0.50	10.00	1.67	16.67	1.00	0.12	0.12	16.79	4.17	0.24	0.06	4.46	**12.32**
4010	1.00	0.50	12.00	1.67	20.00	2.00	0.12	0.24	20.24	4.17	0.24	0.06	4.46	**15.77**
4013	1.00	0.50	10.00	1.67	16.67	2.00	0.12	0.24	16.90	4.17	0.24	0.06	4.46	**12.44**
4014	1.00	0.75	9.00	2.32	20.89	5.00	0.12	0.60	21.49	6.25	0.36	0.09	6.70	**14.79**
2010	1.00	0.50	8.00	2.08	16.67	4.00	0.12	0.48	17.14	4.17	0.24	0.06	4.46	**12.68**
2037	1.00	0.50	6.00	2.08	12.50	5.00	0.12	0.60	13.10	4.17	0.24	0.06	4.46	**8.63**
2051	1.00	0.75	12.00	2.32	27.86	1.00	0.12	0.12	27.98	6.25	0.36	0.09	6.70	**21.28**
3001	1.00	0.50	6.00	2.32	13.93	4.00	0.12	0.48	14.40	4.17	0.24	0.06	4.46	**9.94**
4003	1.00	0.50	8.00	2.32	18.57	2.00	0.12	0.24	18.81	4.17	0.24	0.06	4.46	**14.35**
4002	1.00	0.50	10.00	2.32	23.21	1.00	0.12	0.12	23.33	4.17	0.24	0.06	4.46	**18.87**
4004	1.00	0.50	12.00	2.32	27.86	2.00	0.12	0.24	28.10	4.17	0.24	0.06	4.46	**23.63**
2057	1.50	0.75	12.00	2.32	27.86	2.00	0.12	0.24	28.10	6.25	0.36	0.09	6.70	**21.40**
1026	3.00	0.50	9.00	2.32	20.89	6.00	0.12	0.71	21.61	4.17	0.24	0.06	4.46	**17.14**
5001	3.00	3.00	35.00	2.32	81.25	2.00	0.12	0.24	81.49	25.00	1.43	0.36	26.79	**54.70**
Total	**51.55**	**37.00**	**604.50**		**1,252.53**	**174.50**		**20.77**	**1,273.30**	**308.33**	**17.62**	**4.40**	**330.36**	**942.95**

BW : **Baby worms** ***Average price of fresh cocoons /kg*** **2.08 USD**
Co : **Cocoons** ***Average productions of fresh cocoons /box*** **16.34 Kg**

	Average	
	Cocoons/box (Kg)	Price of cocoons/kg (USD)
Larger size of farm	16.07	2.02
Middle size of farm	16.42	2.09
Small size of farm	19.33	2.24

Appendix 24: 16th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 16 **1 USD : Rp 8,400.00**

Total BW : **10.00 Box** **Price of BW/Box: 8.33 USD**

Month:	***Sep-00***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total**				**Total**	**Total**
			Co	**Price/kg**	**Total I**	**Co**	**Price/kg**	**Total II**	**Sales (I+II)**	**BW**	**Papzol**	**CaCo3**	**Cost**	**Revenue**
	(Ha)	**(Box)**	**(Kg)**	**(USD)**	**(USD)**	**(Kg)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**
3006	0.50	0.25	5.00	2.32	11.61	1.00	0.12	0.12	11.73	2.08	0.12	0.03	2.23	**9.49**
1030	0.50	0.25	4.00	2.08	8.33	1.50	0.12	0.18	8.51	2.08	0.12	0.03	2.23	**6.28**
1039	0.50	0.25	5.00	2.08	10.42	1.00	0.12	0.12	10.54	2.08	0.12	0.03	2.23	**8.30**
2063	0.50	0.25	3.00	1.67	5.00	2.00	0.12	0.24	5.24	2.08	0.12	0.03	2.23	**3.01**
2049	0.50	0.25	4.00	2.08	8.33	4.00	0.12	0.48	8.81	2.08	0.12	0.03	2.23	**6.58**
2043	0.50	0.50	8.00	2.08	16.67	5.00	0.12	0.60	17.26	4.17	0.24	0.06	4.46	**12.80**
2019	0.50	0.50	8.50	2.08	17.71	4.00	0.12	0.48	18.18	4.17	0.24	0.06	4.46	**13.72**
2020	0.50	0.50	15.00	2.08	31.25	2.00	0.12	0.24	31.49	4.17	0.24	0.06	4.46	**27.02**
2024	0.50	0.50	8.00	2.08	16.67	2.00	0.12	0.24	16.90	4.17	0.24	0.06	4.46	**12.44**
2025	0.50	0.50	8.00	2.08	16.67	3.50	0.12	0.42	17.08	4.17	0.24	0.06	4.46	**12.62**
2026	0.50	0.50	12.00	2.08	25.00	1.00	0.12	0.12	25.12	4.17	0.24	0.06	4.46	**20.65**
2044	0.50	0.25	5.00	2.08	10.42	2.00	0.12	0.24	10.65	2.08	0.12	0.03	2.23	**8.42**
2027	0.50	0.50	10.00	2.08	20.83	1.00	0.12	0.12	20.95	4.17	0.24	0.06	4.46	**16.49**
7001	1.00	0.50	10.00	2.08	20.83	1.50	0.12	0.18	21.01	4.17	0.24	0.06	4.46	**16.55**
7004	1.00	0.50	9.00	2.08	18.75	1.00	0.12	0.12	18.87	4.17	0.24	0.06	4.46	**14.40**
7007	1.00	0.50	9.00	2.08	18.75	2.00	0.12	0.24	18.99	4.17	0.24	0.06	4.46	**14.52**
7008	1.00	0.50	8.00	2.32	18.57	2.00	0.12	0.24	18.81	4.17	0.24	0.06	4.46	**14.35**
7009	1.00	0.50	9.00	2.32	20.89	1.50	0.12	0.18	21.07	4.17	0.24	0.06	4.46	**16.61**
7012	1.00	0.50	11.00	2.08	22.92	2.00	0.12	0.24	23.15	4.17	0.24	0.06	4.46	**18.69**
7002	1.50	1.00	15.00	2.08	31.25	1.00	0.12	0.12	31.37	8.33	0.48	0.12	8.93	**22.44**
1026	3.00	1.00	15.00	2.08	31.25	2.00	0.12	0.24	31.49	8.33	0.48	0.12	8.93	**22.56**
Total	**17.00**	**10.00**	**181.50**		**382.11**	**43.00**		**5.12**	**387.23**	**83.33**	**4.76**	**1.19**	**89.29**	**297.95**

BW : Baby worms ***Average price of fresh cocoons /kg*** **2.10 USD**

Co : Cocoons ***Average productions of fresh cocoons /box*** **18.15 Kg**

	Average	
	Cocoons/box (Kg)	**Price of cocoons/kg (USD)**
Larger size of farm	17.20	2.14
Middle size of farm	19.10	2.07
Small size of farm	0.00	-

Appendix 25: 17th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 17 **1 USD : Rp 8,400.00**

Total BW : **20.00 Box** **Price of BW/Box: 8.33 USD**

Month:	***Oct-00***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total Sales (I+II)**				**Total Cost**	**Total Revenue**
	(Ha)	**(Box)**	**Co (Kg)**	**Price/kg (USD)**	**Total I (USD)**	**Co (Kg)**	**Price/kg (USD)**	**Total II (USD)**	**(USD)**	**BW (USD)**	**Papzol (USD)**	**CaCo3 (USD)**	**(USD)**	**(USD)**
3004	0.30	0.25	5.00	2.32	11.61	2.00	0.12	0.24	11.85	2.08	0.12	0.03	2.23	**9.61**
3003	0.30	0.25	5.00	2.32	11.61	1.00	0.12	0.12	11.73	2.08	0.12	0.03	2.23	**9.49**
2004	0.30	0.25	6.00	2.32	13.93	0.00	0.12	0.00	13.93	2.08	0.12	0.03	2.23	**11.70**
2008	0.30	0.25	5.00	2.32	11.61	0.00	0.12	0.00	11.61	2.08	0.12	0.03	2.23	**9.38**
1047	0.50	0.25	4.00	2.08	8.33	2.50	0.12	0.30	8.63	2.08	0.12	0.03	2.23	**6.40**
1012	0.50	0.25	5.00	2.32	11.61	1.00	0.12	0.12	11.73	2.08	0.12	0.03	2.23	**9.49**
1013	0.50	0.25	4.00	2.08	8.33	2.00	0.12	0.24	8.57	2.08	0.12	0.03	2.23	**6.34**
1014	0.50	0.25	6.00	2.32	13.93	0.00	0.12	0.00	13.93	2.08	0.12	0.03	2.23	**11.70**
1016	0.50	0.25	5.00	2.32	11.61	1.00	0.12	0.12	11.73	2.08	0.12	0.03	2.23	**9.49**
1019	0.50	0.25	4.00	2.08	8.33	3.00	0.12	0.36	8.69	2.08	0.12	0.03	2.23	**6.46**
2028	0.50	0.25	5.00	2.08	10.42	1.00	0.12	0.12	10.54	2.08	0.12	0.03	2.23	**8.30**
2029	0.50	0.25	4.00	2.08	8.33	1.00	0.12	0.12	8.45	2.08	0.12	0.03	2.23	**6.22**
2030	0.50	0.25	5.00	2.08	10.42	2.00	0.12	0.24	10.65	2.08	0.12	0.03	2.23	**8.42**
2031	0.50	0.25	4.00	2.32	9.29	1.00	0.12	0.12	9.40	2.08	0.12	0.03	2.23	**7.17**
2032	0.50	0.25	5.00	2.08	10.42	1.00	0.12	0.12	10.54	2.08	0.12	0.03	2.23	**8.30**
2033	0.50	0.25	6.00	2.08	12.50	0.00	0.12	0.00	12.50	2.08	0.12	0.03	2.23	**10.27**
2035	0.50	0.25	5.00	2.08	10.42	0.00	0.12	0.00	10.42	2.08	0.12	0.03	2.23	**8.18**
4018	0.50	0.25	4.00	2.08	8.33	3.00	0.12	0.36	8.69	2.08	0.12	0.03	2.23	**6.46**
4019	0.50	0.25	3.50	1.67	5.83	5.00	0.12	0.60	6.43	2.08	0.12	0.03	2.23	**4.20**
2063	0.50	0.25	4.00	2.08	8.33	1.00	0.12	0.12	8.45	2.08	0.12	0.03	2.23	**6.22**
2006	0.50	0.25	5.00	2.32	11.61	1.00	0.12	0.12	11.73	2.08	0.12	0.03	2.23	**9.49**
2047	0.50	0.25	4.50	2.08	9.38	1.00	0.12	0.12	9.49	2.08	0.12	0.03	2.23	**7.26**
2019	0.50	0.50	6.00	2.32	13.93	5.00	0.12	0.60	14.52	4.17	0.24	0.06	4.46	**10.06**
2020	0.50	0.50	8.00	2.32	18.57	4.00	0.12	0.48	19.05	4.17	0.24	0.06	4.46	**14.58**
2024	0.50	0.50	5.50	1.67	9.17	6.00	0.12	0.71	9.88	4.17	0.24	0.06	4.46	**5.42**
2025	0.50	0.50	5.50	1.67	9.17	5.00	0.12	0.60	9.76	4.17	0.24	0.06	4.46	**5.30**
2026	0.50	0.50	5.00	1.67	8.33	5.00	0.12	0.60	8.93	4.17	0.24	0.06	4.46	**4.46**

Appendix 25: 17th Yield fresh cocoons (continue)

2017	0.50	0.50	8.00	2.32	18.57	6.00	0.12	0.71	19.29	4.17	0.24	0.06	4.46	**14.82**
2027	0.50	0.50	10.00	2.32	23.21	5.00	0.12	0.60	23.81	4.17	0.24	0.06	4.46	**19.35**
2028	0.50	0.50	6.00	2.08	12.50	1.00	0.12	0.12	12.62	4.17	0.24	0.06	4.46	**8.15**
2029	0.50	0.50	5.00	2.08	10.42	0.00	0.12	0.00	10.42	4.17	0.24	0.06	4.46	**5.95**
2030	0.50	0.50	9.00	2.08	18.75	4.50	0.12	0.54	19.29	4.17	0.24	0.06	4.46	**14.82**
2031	0.50	0.50	5.00	2.08	10.42	6.00	0.12	0.71	11.13	4.17	0.24	0.06	4.46	**6.67**
2032	0.50	0.50	6.00	2.08	12.50	5.00	0.12	0.60	13.10	4.17	0.24	0.06	4.46	**8.63**
2033	0.50	0.50	6.00	1.67	10.00	5.00	0.12	0.60	10.60	4.17	0.24	0.06	4.46	**6.13**
2035	0.50	0.50	6.00	1.67	10.00	4.00	0.12	0.48	10.48	4.17	0.24	0.06	4.46	**6.01**
2039	0.50	0.50	4.00	1.67	6.67	4.00	0.12	0.48	7.14	4.17	0.24	0.06	4.46	**2.68**
2040	0.50	0.50	6.00	1.67	10.00	6.00	0.12	0.71	10.71	4.17	0.24	0.06	4.46	**6.25**
2041	0.50	0.50	5.00	2.08	10.42	6.00	0.12	0.71	11.13	4.17	0.24	0.06	4.46	**6.67**
4021	1.00	0.50	9.00	2.32	20.89	5.00	0.12	0.60	21.49	4.17	0.24	0.06	4.46	**17.02**
4023	1.00	0.50	8.00	2.32	18.57	4.50	0.12	0.54	19.11	4.17	0.24	0.06	4.46	**14.64**
5002	1.00	0.50	12.00	2.32	27.86	1.00	0.12	0.12	27.98	4.17	0.24	0.06	4.46	**23.51**
1001	1.00	0.50	12.50	2.32	29.02	1.00	0.12	0.12	29.14	4.17	0.24	0.06	4.46	**24.67**
1002	1.00	0.50	8.00	2.08	16.67	4.00	0.12	0.48	17.14	4.17	0.24	0.06	4.46	**12.68**
1003	1.00	0.50	10.00	2.08	20.83	4.00	0.12	0.48	21.31	4.17	0.24	0.06	4.46	**16.85**
1006	1.00	0.50	5.00	2.32	11.61	5.00	0.12	0.60	12.20	4.17	0.24	0.06	4.46	**7.74**
1007	1.00	0.50	7.50	2.32	17.41	4.00	0.12	0.48	17.89	4.17	0.24	0.06	4.46	**13.42**
1010	1.00	0.50	10.00	2.32	23.21	5.00	0.12	0.60	23.81	4.17	0.24	0.06	4.46	**19.35**
1011	1.00	0.50	9.00	2.08	18.75	6.00	0.12	0.71	19.46	4.17	0.24	0.06	4.46	**15.00**
3011	3.00	1.00	13.00	2.08	27.08	2.00	0.12	0.24	27.32	8.33	0.48	0.12	8.93	**18.39**
Total	**31.70**	**20.00**	**314.00**		**670.68**	**148.50**		**17.68**	**688.36**	**166.67**	**9.52**	**2.38**	**178.57**	**509.79**

BW : **Baby worms** ***Average price of fresh cocoons /kg*** **2.11 USD**

Co : **Cocoons** ***Average productions of fresh cocoons /box*** **15.70 Kg**

	Average	
	Cocoons/box (Kg)	**Price of cocoons/kg (USD)**
Larger size of farm	17.33	2.23
Middle size of farm	14.54	2.05
Small size of farm	21.00	2.32

Appendix 26: 18th Yield fresh cocoons

Banyumas Sutera Alam
Harvest season 18

1 USD : Rp 8,400.00
Total BW : **25.00 Box** **Price of BW/Box: 8.33 USD**

Month:	***Oct-00***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total**				**Total**	**Total**
			Co	**Price/kg**	**Total I**	**Co**	**Price/kg**	**Total II**	**Sales (I+II)**	**BW**	**Papzol**	**CaCo3**	**Cost**	**Revenue**
	(Ha)	**(Box)**	**(Kg)**	**(USD)**	**(USD)**	**(Kg)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**
1047	0.50	0.50	9.00	2.32	20.89	3.00	0.12	0.36	21.25	4.17	0.24	0.06	4.46	16.79
1012	0.50	0.50	10.50	2.08	21.88	2.00	0.12	0.24	22.11	4.17	0.24	0.06	4.46	17.65
1013	0.50	0.50	8.00	2.32	18.57	2.00	0.12	0.24	18.81	4.17	0.24	0.06	4.46	14.35
1014	0.50	0.50	9.00	2.32	20.89	1.00	0.12	0.12	21.01	4.17	0.24	0.06	4.46	16.55
1016	0.50	0.50	12.00	2.08	25.00	2.00	0.12	0.24	25.24	4.17	0.24	0.06	4.46	20.77
1019	0.50	0.50	12.00	2.08	25.00	2.50	0.12	0.30	25.30	4.17	0.24	0.06	4.46	20.83
2046	0.50	0.50	8.00	2.08	16.67	2.00	0.12	0.24	16.90	4.17	0.24	0.06	4.46	12.44
2052	0.50	0.50	8.00	2.08	16.67	3.00	0.12	0.36	17.02	4.17	0.24	0.06	4.46	12.56
2043	0.50	0.50	7.50	2.08	15.63	2.00	0.12	0.24	15.86	4.17	0.24	0.06	4.46	11.40
2044	0.50	0.50	9.00	2.08	18.75	5.00	0.12	0.60	19.35	4.17	0.24	0.06	4.46	14.88
2045	0.50	0.50	8.50	2.08	17.71	5.00	0.12	0.60	18.30	4.17	0.24	0.06	4.46	13.84
2046	0.50	0.50	10.00	2.08	20.83	2.00	0.12	0.24	21.07	4.17	0.24	0.06	4.46	16.61
2035	0.50	0.50	12.00	2.08	25.00	2.50	0.12	0.30	25.30	4.17	0.24	0.06	4.46	20.83
4013	0.50	0.50	18.00	2.08	37.50	1.00	0.12	0.12	37.62	4.17	0.24	0.06	4.46	33.15
7011	0.50	0.25	2.00	1.67	3.33	5.00	0.12	0.60	3.93	2.08	0.12	0.03	2.23	1.70
7013	0.50	0.25	0.00	2.08	0.00	0.00	0.12	0.00	0.00	2.08	0.12	0.03	2.23	-2.23
2062	0.50	0.50	5.00	2.08	10.42	6.00	0.12	0.71	11.13	4.17	0.24	0.06	4.46	6.67
2006	0.50	0.50	12.00	2.32	27.86	0.50	0.12	0.06	27.92	4.17	0.24	0.06	4.46	23.45
2017	0.50	0.50	12.00	2.08	25.00	1.00	0.12	0.12	25.12	4.17	0.24	0.06	4.46	20.65
2019	0.50	0.75	9.00	2.32	20.89	4.00	0.12	0.48	21.37	6.25	0.36	0.09	6.70	14.67
2020	0.50	0.75	15.00	2.32	34.82	5.00	0.12	0.60	35.42	6.25	0.36	0.09	6.70	28.72
2024	0.50	0.75	8.00	2.08	16.67	5.00	0.12	0.60	17.26	6.25	0.36	0.09	6.70	10.57
2025	0.50	0.75	15.00	2.08	31.25	4.00	0.12	0.48	31.73	6.25	0.36	0.09	6.70	25.03
4006	1.00	0.75	15.00	2.08	31.25	2.00	0.12	0.24	31.49	6.25	0.36	0.09	6.70	24.79
4009	1.00	0.75	17.00	2.08	35.42	2.00	0.12	0.24	35.65	6.25	0.36	0.09	6.70	28.96
4010	1.00	0.75	15.00	1.67	25.00	2.00	0.12	0.24	25.24	6.25	0.36	0.09	6.70	18.54
4013	1.00	0.75	10.00	2.08	20.83	4.00	0.12	0.48	21.31	6.25	0.36	0.09	6.70	14.61
4014	1.00	0.75	10.00	2.08	20.83	4.00	0.12	0.48	21.31	6.25	0.36	0.09	6.70	14.61
1018	1.25	0.75	12.00	2.08	25.00	4.00	0.12	0.48	25.48	6.25	0.36	0.09	6.70	18.78
4008	1.50	0.75	12.00	2.08	25.00	4.00	0.12	0.48	25.48	6.25	0.36	0.09	6.70	18.78
4020	1.50	0.75	14.00	2.08	29.17	5.00	0.12	0.60	29.76	6.25	0.36	0.09	6.70	23.07
1050	1.50	0.75	10.00	2.32	23.21	5.00	0.12	0.60	23.81	6.25	0.36	0.09	6.70	17.11
2057	1.50	0.75	12.00	1.67	20.00	5.00	0.12	0.60	20.60	6.25	0.36	0.09	6.70	13.90
1021	2.00	0.50	8.00	2.08	16.67	2.00	0.12	0.24	16.90	4.17	0.24	0.06	4.46	12.44
1026	3.00	2.00	30.00	2.08	62.50	2.00	0.12	0.24	62.74	16.67	0.95	0.24	17.86	44.88
5001	3.00	3.00	45.00	2.32	104.46	3.00	0.12	0.36	104.82	25.00	1.43	0.36	26.79	78.04
Total	**31.75**	**25.00**	**429.50**		**910.57**	**109.50**		**13.04**	**923.60**	**208.33**	**11.90**	**2.98**	**223.21**	**700.39**

BW : Baby worms ***Average price of fresh cocoons /kg*** **2.10 USD**
Co : Cocoons ***Average productions of fresh cocoons /box*** **17.18 Kg**

	Average	
	Cocoons/box (Kg)	**Price of cocoons/kg (USD)**
Larger size of farm	16.15	2.06
Middle size of farm	18.29	2.13
Small size of farm	0.00	-

Appendix 27: 19th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 19 **1 USD : Rp 8,400.00**

Total BW : **35.00 Box** **Price of BW/Box: 8.33 USD**

Month:	***Nov-00***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total**				**Total**	**Total**
			Co	**Price/kg**	**Total I**	**Co**	**Price/kg**	**Total II**	**Sales (I+II)**	**BW**	**Papzol**	**CaCo3**	**Cost**	**Revenue**
	(Ha)	**(Box)**	**(Kg)**	**(USD)**	**(USD)**	**(Kg)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**
3009	0.30	0.25	8.00	2.08	16.67	4.00	0.12	0.48	17.14	2.08	0.12	0.03	2.23	**14.91**
3003	0.30	0.25	10.00	2.08	20.83	2.00	0.12	0.24	21.07	2.08	0.12	0.03	2.23	**18.84**
3004	0.30	0.25	6.00	2.32	13.93	5.00	0.12	0.60	14.52	2.08	0.12	0.03	2.23	**12.29**
2002	0.30	0.25	12.00	2.32	27.86	2.00	0.12	0.24	28.10	2.08	0.12	0.03	2.23	**25.86**
2003	0.30	0.25	4.00	1.67	6.67	1.00	0.12	0.12	6.79	2.08	0.12	0.03	2.23	**4.55**
2004	0.30	0.25	4.50	2.08	9.38	0.50	0.12	0.06	9.43	2.08	0.12	0.03	2.23	**7.20**
1016	0.50	0.50	8.00	2.08	16.67	2.00	0.12	0.24	16.90	4.17	0.24	0.06	4.46	**12.44**
1019	0.50	0.50	6.00	2.32	13.93	1.00	0.12	0.12	14.05	4.17	0.24	0.06	4.46	**9.58**
2028	0.50	0.50	9.00	2.32	20.89	2.00	0.12	0.24	21.13	4.17	0.24	0.06	4.46	**16.67**
2029	0.50	0.50	10.00	2.08	20.83	1.00	0.12	0.12	20.95	4.17	0.24	0.06	4.46	**16.49**
2030	0.50	0.50	12.00	2.32	27.86	0.00	0.12	0.00	27.86	4.17	0.24	0.06	4.46	**23.39**
2031	0.50	0.50	10.00	2.08	20.83	1.00	0.12	0.12	20.95	4.17	0.24	0.06	4.46	**16.49**
2032	0.50	0.50	10.00	2.32	23.21	1.00	0.12	0.12	23.33	4.17	0.24	0.06	4.46	**18.87**
2033	0.50	0.50	9.00	2.08	18.75	5.00	0.12	0.60	19.35	4.17	0.24	0.06	4.46	**14.88**
2035	0.50	0.50	12.00	2.08	25.00	5.00	0.12	0.60	25.60	4.17	0.24	0.06	4.46	**21.13**
4018	0.50	0.50	14.00	2.08	29.17	4.00	0.12	0.48	29.64	4.17	0.24	0.06	4.46	**25.18**
4019	0.50	0.50	12.50	2.32	29.02	5.00	0.12	0.60	29.61	4.17	0.24	0.06	4.46	**25.15**
2063	0.50	0.50	10.00	2.32	23.21	5.00	0.12	0.60	23.81	4.17	0.24	0.06	4.46	**19.35**
2006	0.50	0.50	9.00	2.08	18.75	2.00	0.12	0.24	18.99	4.17	0.24	0.06	4.46	**14.52**
2048	0.50	0.50	8.00	2.08	16.67	3.00	0.12	0.36	17.02	4.17	0.24	0.06	4.46	**12.56**
2019	0.50	0.50	8.00	2.08	16.67	2.00	0.12	0.24	16.90	4.17	0.24	0.06	4.46	**12.44**
2020	0.50	0.50	9.50	2.32	22.05	4.00	0.12	0.48	22.53	4.17	0.24	0.06	4.46	**18.07**
2024	0.50	0.50	7.50	2.32	17.41	2.00	0.12	0.24	17.65	4.17	0.24	0.06	4.46	**13.18**
2025	0.50	0.25	3.00	2.08	6.25	5.00	0.12	0.60	6.85	2.08	0.12	0.03	2.23	**4.61**
2026	0.50	0.50	5.50	2.32	12.77	1.00	0.12	0.12	12.89	4.17	0.24	0.06	4.46	**8.42**
2050	0.50	0.25	5.00	1.67	8.33	1.00	0.12	0.12	8.45	2.08	0.12	0.03	2.23	**6.22**
2027	0.50	0.25	10.00	2.08	20.83	0.00	0.12	0.00	20.83	2.08	0.12	0.03	2.23	**18.60**
2028	0.50	0.50	5.00	2.08	10.42	6.00	0.12	0.71	11.13	4.17	0.24	0.06	4.46	**6.67**
2029	0.50	0.25	6.50	2.32	15.09	7.00	0.12	0.83	15.92	2.08	0.12	0.03	2.23	**13.69**
2030	0.50	0.25	11.00	1.67	18.33	4.00	0.12	0.48	18.81	2.08	0.12	0.03	2.23	**16.58**
2031	0.50	0.25	12.00	2.08	25.00	5.00	0.12	0.60	25.60	2.08	0.12	0.03	2.23	**23.36**
2032	0.50	0.25	6.00	2.08	12.50	5.00	0.12	0.60	13.10	2.08	0.12	0.03	2.23	**10.86**
2033	0.50	0.25	8.00	2.08	16.67	3.00	0.12	0.36	17.02	2.08	0.12	0.03	2.23	**14.79**
2035	0.50	0.50	9.00	2.32	20.89	2.00	0.12	0.24	21.13	4.17	0.24	0.06	4.46	**16.67**
2039	0.50	0.25	5.00	2.08	10.42	3.00	0.12	0.36	10.77	2.08	0.12	0.03	2.23	**8.54**

Appendix 27: 19th Yield fresh cocoons (continue)

2040	0.50	0.25	3.00	1.67	5.00	3.00	0.12	0.36	5.36	2.08	0.12	0.03	2.23	**3.13**
2041	0.50	0.50	12.00	2.08	25.00	2.00	0.12	0.24	25.24	4.17	0.24	0.06	4.46	**20.77**
1047	0.50	0.50	12.00	2.08	25.00	4.00	0.12	0.48	25.48	4.17	0.24	0.06	4.46	**21.01**
1012	0.50	0.50	15.50	2.32	35.98	0.00	0.12	0.00	35.98	4.17	0.24	0.06	4.46	**31.52**
1013	0.50	0.50	12.00	2.32	27.86	5.00	0.12	0.60	28.45	4.17	0.24	0.06	4.46	**23.99**
1014	0.50	0.50	5.00	2.08	10.42	2.00	0.12	0.24	10.65	4.17	0.24	0.06	4.46	**6.19**
4021	1.00	0.50	8.00	2.32	18.57	2.00	0.12	0.24	18.81	4.17	0.24	0.06	4.46	**14.35**
4023	1.00	0.50	5.00	2.32	11.61	8.00	0.12	0.95	12.56	4.17	0.24	0.06	4.46	**8.10**
5002	1.00	0.50	11.00	2.32	25.54	1.00	0.12	0.12	25.65	4.17	0.24	0.06	4.46	**21.19**
1001	1.00	0.50	9.00	2.08	18.75	5.00	0.12	0.60	19.35	4.17	0.24	0.06	4.46	**14.88**
1002	1.00	1.00	12.00	2.08	25.00	3.00	0.12	0.36	25.36	8.33	0.48	0.12	8.93	**16.43**
1003	1.00	0.50	11.00	2.08	22.92	3.00	0.12	0.36	23.27	4.17	0.24	0.06	4.46	**18.81**
1006	1.00	0.75	14.00	2.08	29.17	5.00	0.12	0.60	29.76	6.25	0.36	0.09	6.70	**23.07**
1007	1.00	0.50	10.00	2.08	20.83	3.00	0.12	0.36	21.19	4.17	0.24	0.06	4.46	**16.73**
1010	1.00	0.75	8.00	2.08	16.67	4.00	0.12	0.48	17.14	6.25	0.36	0.09	6.70	**10.45**
1011	1.00	0.75	15.00	2.32	34.82	1.00	0.12	0.12	34.94	6.25	0.36	0.09	6.70	**28.24**
1015	1.00	0.75	4.00	2.32	9.29	4.00	0.12	0.48	9.76	6.25	0.36	0.09	6.70	**3.07**
1022	1.00	0.50	2.00	1.67	3.33	6.00	0.12	0.71	4.05	4.17	0.24	0.06	4.46	**-0.42**
1023	1.00	0.50	4.00	2.08	8.33	2.00	0.12	0.24	8.57	4.17	0.24	0.06	4.46	**4.11**
1024	1.00	0.50	6.00	2.32	13.93	5.00	0.12	0.60	14.52	4.17	0.24	0.06	4.46	**10.06**
1025	1.00	0.50	8.50	2.08	17.71	4.00	0.12	0.48	18.18	4.17	0.24	0.06	4.46	**13.72**
1047	1.00	0.50	10.00	2.08	20.83	2.00	0.12	0.24	21.07	4.17	0.24	0.06	4.46	**16.61**
2010	1.00	0.50	10.00	2.32	23.21	4.00	0.12	0.48	23.69	4.17	0.24	0.06	4.46	**19.23**
2011	1.00	0.50	8.00	2.08	16.67	3.00	0.12	0.36	17.02	4.17	0.24	0.06	4.46	**12.56**
2012	1.00	1.00	10.50	2.08	21.88	4.00	0.12	0.48	22.35	8.33	0.48	0.12	8.93	**13.42**
2013	1.00	0.75	10.00	2.08	20.83	5.00	0.12	0.60	21.43	6.25	0.36	0.09	6.70	**14.73**
2014	1.00	0.75	9.00	2.08	18.75	5.00	0.12	0.60	19.35	6.25	0.36	0.09	6.70	**12.65**
2018	1.00	0.75	12.00	2.08	25.00	2.00	0.12	0.24	25.24	6.25	0.36	0.09	6.70	**18.54**
2021	1.00	0.75	15.00	2.08	31.25	2.00	0.12	0.24	31.49	6.25	0.36	0.09	6.70	**24.79**
2023	1.00	1.00	15.00	2.32	34.82	2.00	0.12	0.24	35.06	8.33	0.48	0.12	8.93	**26.13**
3011	3.00	3.00	35.00	2.32	81.25	2.00	0.12	0.24	81.49	25.00	1.43	0.36	26.79	**54.70**
Total	**46.30**	**35.00**	**616.50**		**1,333.96**	**204.50**		**24.35**	**1,358.30**	**291.67**	**16.67**	**4.17**	**312.50**	**1,045.80**

BW : Baby worms — ***Average price of fresh cocoons /kg*** **2.14 USD** -

Co : Cocoons — ***Average productions of fresh cocoons /box*** **17.61 Kg**

	Average	
	Cocoons/box (Kg)	**Price of cocoons/kg (USD)**
Larger size of farm	14.16	2.15
Middle size of farm	20.67	2.14
Small size of farm	29.67	2.09

Appendix 28: 20th Yield fresh cocoons

Banyumas Sutera Alam
Harvest season 20

1 USD : Rp 8,400.00
Total BW : **25.00 Box** **Price of BW/Box: 8.33 USD**

Month:	***Nov-00***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total Sales (I+II) (USD)**				**Total Cost (USD)**	**Total Revenue (USD)**
	(Ha)	**(Box)**	**Co (Kg)**	**Price/kg (USD)**	**Total I (USD)**	**Co (Kg)**	**Price/kg (USD)**	**Total II (USD)**		**BW (USD)**	**Papzol (USD)**	**CaCo3 (USD)**		
1028	0.50	0.50	5.00	2.32	11.61	3.00	0.12	0.36	11.96	4.17	0.24	0.06	4.46	**7.50**
1012	0.50	0.50	5.50	2.08	11.46	2.00	0.12	0.24	11.70	4.17	0.24	0.06	4.46	**7.23**
1013	0.50	0.50	5.00	2.32	11.61	2.00	0.12	0.24	11.85	4.17	0.24	0.06	4.46	**7.38**
1014	0.50	0.50	6.20	2.32	14.39	1.00	0.12	0.12	14.51	4.17	0.24	0.06	4.46	**10.05**
1016	0.50	0.50	5.00	2.08	10.42	2.00	0.12	0.24	10.65	4.17	0.24	0.06	4.46	**6.19**
1019	0.50	0.75	12.00	2.08	25.00	3.50	0.12	0.42	25.42	6.25	0.36	0.09	6.70	**18.72**
2028	0.50	0.75	12.50	2.08	26.04	2.00	0.12	0.24	26.28	6.25	0.36	0.09	6.70	**19.58**
2029	0.50	0.75	8.00	2.32	18.57	4.00	0.12	0.48	19.05	6.25	0.36	0.09	6.70	**12.35**
2040	0.50	0.75	13.00	2.08	27.08	1.00	0.12	0.12	27.20	6.25	0.36	0.09	6.70	**20.51**
2041	0.50	0.75	12.00	2.08	25.00	1.50	0.12	0.18	25.18	6.25	0.36	0.09	6.70	**18.48**
2043	0.50	0.75	11.00	2.08	22.92	2.50	0.12	0.30	23.21	6.25	0.36	0.09	6.70	**16.52**
2044	0.50	0.75	10.50	2.08	21.88	2.00	0.12	0.24	22.11	6.25	0.36	0.09	6.70	**15.42**
2045	0.50	0.75	10.00	2.08	20.83	2.00	0.12	0.24	21.07	6.25	0.36	0.09	6.70	**14.38**
4018	0.50	0.50	11.00	2.32	25.54	3.00	0.12	0.36	25.89	4.17	0.24	0.06	4.46	**21.43**
4019	0.50	0.50	9.00	2.08	18.75	2.00	0.12	0.24	18.99	4.17	0.24	0.06	4.46	**14.52**
2062	0.50	1.00	13.00	2.08	27.08	1.50	0.12	0.18	27.26	8.33	0.48	0.12	8.93	**18.33**
2006	0.50	1.00	8.00	2.08	16.67	1.50	0.12	0.18	16.85	8.33	0.48	0.12	8.93	**7.92**
2017	0.50	1.00	15.00	2.08	31.25	2.00	0.12	0.24	31.49	8.33	0.48	0.12	8.93	**22.56**
2019	0.50	0.75	9.50	2.32	22.05	3.00	0.12	0.36	22.41	6.25	0.36	0.09	6.70	**15.71**
2020	0.50	0.75	9.50	2.08	19.79	1.00	0.12	0.12	19.91	6.25	0.36	0.09	6.70	**13.21**
5002	1.00	1.00	15.00	2.32	34.82	3.00	0.12	0.36	35.18	8.33	0.48	0.12	8.93	**26.25**
1001	1.00	1.00	13.00	2.32	30.18	2.00	0.12	0.24	30.42	8.33	0.48	0.12	8.93	**21.49**
1002	1.00	1.00	12.00	2.32	27.86	1.00	0.12	0.12	27.98	8.33	0.48	0.12	8.93	**19.05**
1003	1.00	1.00	16.00	2.08	33.33	1.00	0.12	0.12	33.45	8.33	0.48	0.12	8.93	**24.52**
1006	1.00	0.75	15.00	2.08	31.25	2.50	0.12	0.30	31.55	6.25	0.36	0.09	6.70	**24.85**
1007	1.00	0.75	12.00	2.32	27.86	1.00	0.12	0.12	27.98	6.25	0.36	0.09	6.70	**21.28**
1010	1.00	0.75	6.00	1.67	10.00	1.50	0.12	0.18	10.18	6.25	0.36	0.09	6.70	**3.48**
1011	1.00	0.75	16.00	2.32	37.14	2.00	0.12	0.24	37.38	6.25	0.36	0.09	6.70	**30.68**
1026	3.00	4.00	27.50	2.08	57.29	2.00	0.12	0.24	57.53	33.33	1.90	0.48	35.71	**21.82**
Total	**21.00**	**25.00**	**323.20**		**697.67**	**58.50**		**6.96**	**704.63**	**208.33**	**11.90**	**2.98**	**223.21**	**481.42**

BW : Baby worms ***Average price of fresh cocoons /kg*** **2.16 USD** -
Co : Cocoons ***Average productions of fresh cocoons /box*** **12.93 Kg**

	Average	
	Cocoons/box (Kg)	**Price of cocoons/kg (USD)**
Larger size of farm	12.05	2.17
Middle size of farm	13.62	2.15
Small size of farm	0.00	-

Appendix 29: 21st Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 21 **1 USD : Rp 8,400.00**

Total BW : **34.63 Box** **Price of BW/Box : 8.33 USD**

Month:	***Dec-00***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total Sales (I+II)**	**BW**	**Papzol**	**CaCo3**	**Total Cost**	**Total Revenue**
	(Ha)	**(Box)**	**Co (Kg)**	**Price/kg (USD)**	**Total I (USD)**	**Co (Kg)**	**Price/kg (USD)**	**Total II (USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(Rp)**	**(USD)**
2001	0.40	0.25	7.00	2.36	16.51	0.00	0.18	0.00	16.51	2.08	0.00	0.00	2.08	14.43
2049	0.45	0.75	5.00	2.28	11.39	0.00	0.18	0.00	11.39	6.25	0.65	0.00	6.90	4.48
1012	0.50	0.50	8.70	2.35	20.46	0.00	0.18	0.00	20.46	4.17	0.65	0.00	4.82	15.64
1013	0.50	0.50	11.70	2.28	26.64	0.00	0.18	0.00	26.64	4.17	0.65	0.00	4.82	21.82
1014	0.50	0.25	0.80	1.77	1.42	0.00	0.18	0.00	1.42	2.08	0.65	0.00	2.74	-1.32
1016	0.50	0.25	7.80	2.15	16.81	0.00	0.18	0.00	16.81	2.08	0.65	0.00	2.74	14.07
1019	0.50	0.25	5.20	2.24	11.62	0.00	0.18	0.00	11.62	2.08	0.65	0.00	2.74	8.89
1047	0.50	0.50	11.60	2.27	26.37	0.00	0.18	0.00	26.37	4.17	0.65	0.00	4.82	21.55
2006	0.50	0.25	3.50	1.93	6.77	0.00	0.18	0.00	6.77	2.08	0.65	0.00	2.74	4.03
2017	0.50	0.25	0.60	2.36	1.42	0.00	0.18	0.00	1.42	2.08	0.65	0.00	2.74	-1.32
2019	0.50	0.25	3.00	2.24	6.71	0.00	0.18	0.00	6.71	2.08	0.65	0.00	2.74	3.97
2020	0.50	0.25	3.30	2.28	7.51	0.00	0.18	0.00	7.51	2.08	0.65	0.00	2.74	4.78
2024	0.50	0.50	5.50	2.16	11.85	0.00	0.18	0.00	11.85	4.17	0.65	0.00	4.82	7.03
2025	0.50	0.25	3.20	2.44	7.81	0.00	0.18	0.00	7.81	2.08	0.65	0.00	2.74	5.07
2026	0.50	0.25	2.20	2.15	4.74	0.00	0.18	0.00	4.74	2.08	0.65	0.00	2.74	2.00
2027	0.50	0.25	3.40	1.65	5.63	0.00	0.18	0.00	5.63	2.08	0.65	0.00	2.74	2.89
2028	0.50	0.50	12.00	2.27	27.28	0.00	0.18	0.00	27.28	4.17	0.65	0.00	4.82	22.46
2029	0.50	1.00	17.50	1.59	27.76	0.00	0.18	0.00	27.76	8.33	0.65	0.00	8.99	18.77
2030	0.50	1.00	23.80	2.45	58.23	0.00	0.18	0.00	58.23	8.33	0.65	0.00	8.99	49.25
2031	0.50	0.25	6.40	2.36	15.10	0.00	0.18	0.00	15.10	2.08	0.65	0.00	2.74	12.36
2032	0.50	0.75	17.00	1.93	32.88	0.00	0.18	0.00	32.88	6.25	0.65	0.00	6.90	25.98
2033	0.50	0.50	12.80	2.15	27.58	0.00	0.18	0.00	27.58	4.17	0.65	0.00	4.82	22.76
2035	0.50	0.75	10.50	2.44	25.63	0.00	0.18	0.00	25.63	6.25	0.65	0.00	6.90	18.73
2039	0.50	0.25	3.10	2.49	7.73	0.00	0.18	0.00	7.73	2.08	0.65	0.00	2.74	4.99
2040	0.50	0.25	3.10	2.45	7.59	0.00	0.18	0.00	7.59	2.08	0.65	0.00	2.74	4.85
1028	0.50	0.50	3.00	2.23	6.70	0.00	0.18	0.00	6.70	4.17	0.65	0.00	4.82	1.87
1030	0.50	1.13	7.00	2.57	17.99	0.00	0.18	0.00	17.99	9.38	0.65	0.00	10.03	7.96
2041	0.50	0.75	8.90	2.08	18.51	0.00	0.18	0.00	18.51	6.25	0.65	0.00	6.90	11.60
2043	0.50	0.25	5.00	2.15	10.77	0.00	0.18	0.00	10.77	2.08	0.65	0.00	2.74	8.04
2044	0.50	0.75	19.00	2.40	45.67	0.00	0.18	0.00	45.67	6.25	0.65	0.00	6.90	38.76

Appendix 29: 21st Yield fresh cocoons (continue)

2045	0.50	0.75	23.00	2.58	59.35	0.00	0.18	0.00	59.35	6.25	0.65	0.00	6.90	52.45
2046	0.50	0.50	4.80	1.77	8.51	0.00	0.18	0.00	8.51	4.17	0.65	0.00	4.82	3.69
2047	0.50	0.25	3.70	2.28	8.43	0.00	0.18	0.00	8.43	2.08	0.65	0.00	2.74	5.69
2048	0.50	0.75	2.40	2.04	4.90	0.00	0.18	0.00	4.90	6.25	0.65	0.00	6.90	-2.01
2050	0.50	0.50	12.00	2.44	29.29	0.00	0.18	0.00	29.29	4.17	0.65	0.00	4.82	24.47
2052	0.50	0.75	8.50	2.16	18.32	0.00	0.18	0.00	18.32	6.25	0.65	0.00	6.90	11.42
2053	0.50	0.75	11.00	2.27	25.01	0.00	0.18	0.00	25.01	6.25	0.65	0.00	6.90	18.10
2061	0.50	0.25	2.00	2.24	4.47	0.00	0.18	0.00	4.47	2.08	0.65	0.00	2.74	1.73
2063	0.50	0.25	8.80	2.31	20.32	0.00	0.18	0.00	20.32	2.08	0.65	0.00	2.74	17.58
4013	0.50	0.25	2.30	1.97	4.53	0.00	0.18	0.00	4.53	2.08	0.65	0.00	2.74	1.79
7011	0.50	0.50	1.30	1.90	2.47	0.00	0.18	0.00	2.47	4.17	0.65	0.00	4.82	-2.35
7013	0.50	0.50	14.50	2.31	33.48	0.00	0.18	0.00	33.48	4.17	0.65	0.00	4.82	28.65
4006	1.00	0.75	18.00	2.45	44.04	0.00	0.18	0.00	44.04	6.25	0.65	0.00	6.90	37.14
4009	1.00	1.00	19.00	1.75	33.27	0.00	0.18	0.00	33.27	8.33	0.65	0.00	8.99	24.28
4010	1.00	1.25	23.00	2.28	52.37	0.00	0.18	0.00	52.37	10.42	0.65	0.00	11.07	41.29
4013	1.00	0.50	11.50	2.58	29.68	0.00	0.18	0.00	29.68	4.17	0.65	0.00	4.82	24.85
4014	1.00	0.75	2.30	2.08	4.78	0.00	0.18	0.00	4.78	6.25	0.65	0.00	6.90	-2.12
1018	1.25	1.25	16.90	2.28	38.49	0.00	0.18	0.00	38.49	10.42	0.65	0.00	11.07	27.41
1050	1.50	1.00	13.30	2.36	31.38	0.00	0.18	0.00	31.38	8.33	0.65	0.00	8.99	22.39
2057	1.50	0.50	8.00	2.16	17.24	0.00	0.18	0.00	17.24	4.17	0.65	0.00	4.82	12.42
4008	1.50	1.13	14.70	2.08	30.55	0.00	0.18	0.00	30.55	9.38	0.65	0.00	10.03	20.52
4020	1.50	0.75	7.50	2.40	18.03	0.00	0.18	0.00	18.03	6.25	0.65	0.00	6.90	11.12
1021	2.00	1.13	9.50	2.24	21.23	0.00	0.18	0.00	21.23	9.38	0.65	0.00	10.03	11.21
3011	3.00	3.00	31.50	2.36	74.31	0.00	0.18	0.00	74.31	25.00	0.65	0.00	25.65	48.66
5001	3.00	1.50	9.30	2.15	20.04	0.00	0.18	0.00	20.04	12.50	0.65	0.00	13.15	6.88
Total	**41.10**	**34.63**	**510.40**		**1,147.53**	**0.00**		**0.00**	**1,147.53**	**288.54**	**35.36**	**0.00**	**323.90**	**823.63**

BW : **Baby worms** ***Average price of fresh cocoons /kg*** **2.22 USD**

Co : **Cocoons** ***Average productions of fresh cocoons /box*** **14.74 Kg**

	Average	
	Cocoons/box (Kg)	**Price of cocoons/kg (USD)**
Larger size of farm	12.72	2.24
Middle size of farm	16.41	2.20
Small size of farm	12.00	2.32

Appendix 30: 22nd Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 22 **1 USD : Rp 8,400.00**

Total BW : **19.63 Box** **Price of BW/Box : 8.33 USD**

Month:	*Jan-01*		Sales							Cost				
ID	Land	BW	fresh cocoons (good quality)			poor quality			Total Sales (I+II)				Total Cost	Total Revenue
	(Ha)	(Box)	Co (Kg)	Price/kg (USD)	Total I (USD)	Co (Kg)	Price/kg (USD)	Total II (USD)	(USD)	BW (USD)	Papzol (USD)	CaCo3 (USD)	(Rp)	(USD)
3004	0.30	0.13	6.20	2.40	14.85	0.00	0.18	0.00	14.85	1.04	0.33	0.01	1.38	13.47
3003	0.30	0.13	1.80	2.32	4.17	0.00	0.18	0.00	4.17	1.04	0.33	0.01	1.38	2.79
2004	0.30	0.50	11.50	2.39	27.43	0.00	0.18	0.00	27.43	4.17	0.00	0.06	4.23	23.21
2008	0.30	0.25	1.70	2.49	4.23	0.00	0.18	0.00	4.23	2.08	0.33	0.03	2.44	1.79
2009	0.30	0.63	1.40	2.57	3.60	0.00	0.18	0.00	3.60	5.21	0.33	0.07	5.61	-2.01
1047	0.50	0.50	9.30	2.35	21.87	0.00	0.18	0.00	21.87	4.17	0.33	0.06	4.55	17.32
1012	0.50	0.25	4.60	2.31	10.62	0.00	0.18	0.00	10.62	2.08	0.33	0.03	2.44	8.18
1013	0.50	0.38	4.80	2.51	12.04	0.00	0.18	0.00	12.04	3.13		0.04	3.17	8.87
1014	0.50	0.25	5.00	2.49	12.43	0.00	0.18	0.00	12.43	2.08	0.33	0.03	2.44	9.99
1016	0.50	1.00	7.50	2.31	17.32	0.00	0.18	0.00	17.32	8.33	0.33	0.12	8.78	8.54
1019	0.50	0.25	5.50	2.32	12.74	0.00	0.18	0.00	12.74	2.08	0.33	0.03	2.44	10.29
2028	0.50	1.00	16.00	2.62	41.87	0.00	0.18	0.00	41.87	8.33		0.12	8.45	33.42
2029	0.50	0.25	5.50	2.52	13.88	0.00	0.18	0.00	13.88	2.08	0.33	0.03	2.44	11.43
2030	0.50	0.25	4.00	2.24	8.94	0.00	0.18	0.00	8.94	2.08		0.03	2.11	6.83
2031	0.50	0.50	13.00	2.40	31.14	0.00	0.18	0.00	31.14	4.17	0.33	0.06	4.55	26.59
2032	0.50	0.25	3.40	2.43	8.26	0.00	0.18	0.00	8.26	2.08		0.03	2.11	6.15
2033	0.50	0.13	2.00	2.47	4.95	0.00	0.18	0.00	4.95	1.04		0.01	1.06	3.89
2035	0.50	0.25	3.40	2.43	8.26	0.00	0.18	0.00	8.26	2.08		0.03	2.11	6.15
4018	0.50	0.25	4.20	2.15	9.05	0.00	0.18	0.00	9.05	2.08	0.33	0.03	2.44	6.61
7011	0.50	0.25	5.10	2.32	11.81	0.00	0.18	0.00	11.81	2.08	0.33	0.03	2.44	9.37
7013	0.50	0.25	2.50	2.12	5.29	0.00	0.18	0.00	5.29	2.08	0.33	0.03	2.44	2.85
2063	0.50	0.25	3.50	2.40	8.38	0.00	0.18	0.00	8.38	2.08	0.33	0.03	2.44	5.94
2006	0.50	1.00	21.00	2.40	50.47	0.00	0.18	0.00	50.47	8.33	0.33	0.12	8.78	41.69

Appendix 30: 22nd Yield fresh cocoons (continue)

2017	0.50	0.25	1.70	2.45	4.17	0.00	0.18	0.00	4.17	2.08	0.33	0.03	2.44	1.73
2019	0.50	0.50	11.50	2.40	27.64	0.00	0.18	0.00	27.64	4.17		0.06	4.23	23.41
2020	0.50	0.50	6.10	2.24	13.64	0.00	0.18	0.00	13.64	4.17	0.33	0.06	4.55	9.09
2024	0.50	0.50	7.70	2.70	20.81	0.00	0.18	0.00	20.81	4.17	0.33	0.06	4.55	16.25
2025	0.50	0.25	2.90	2.28	6.60	0.00	0.18	0.00	6.60	2.08		0.03	2.11	4.49
4009	1.00	0.75	14.00	2.47	34.63	0.00	0.18	0.00	34.63	6.25	0.33	0.09	6.67	27.97
4010	1.00	0.25	4.80	2.40	11.54	0.00	0.18	0.00	11.54	2.08	0.33	0.03	2.44	9.10
4013	1.00	2.00	11.00	2.37	26.12	0.00	0.18	0.00	26.12	16.67	0.33	0.24	17.23	8.89
4014	1.00	1.00	16.50	2.47	40.82	0.00	0.18	0.00	40.82	8.33	0.33	0.12	8.78	32.04
1018	1.25	0.50	5.00	2.24	11.18	0.00	0.18	0.00	11.18	4.17	0.33	0.06	4.55	6.62
4008	1.50	0.25	3.00	2.08	6.24	0.00	0.18	0.00	6.24	2.08		0.03	2.11	4.13
4020	1.50	0.50	1.80	2.36	4.25	0.00	0.18	0.00	4.25	4.17	0.33	0.06	4.55	-0.31
1050	1.50	1.00	6.60	2.24	14.75	0.00	0.18	0.00	14.75	8.33		0.12	8.45	6.30
2057	1.50	0.25	3.20	2.44	7.81	0.00	0.18	0.00	7.81	2.08	0.33	0.03	2.44	5.37
1021	2.00	1.00	13.50	2.52	34.06	0.00	0.18	0.00	34.06	8.33	0.65	0.12	9.11	24.95
1026	3.00	0.25	1.60	2.31	3.69	0.00	0.18	0.00	3.69	2.08	0.33	0.03	2.44	1.25
5001	3.00	1.00	4.00	2.28	9.11	0.00	0.18	0.00	9.11	8.33	0.33	0.12	8.78	0.33
Total	**32.25**	**19.63**	**257.80**		**620.66**	**0.00**		**0.00**	**620.66**	**163.54**	**9.82**	**2.34**	**175.70**	**444.96**

BW : **Baby worms** — ***Average price of fresh cocoons /kg*** **2.38 USD**

Co : **Cocoons** — ***Average productions of fresh cocoons /box*** **13.14 Kg**

	Average	
	Cocoons/box (Kg)	Price of cocoons/kg (USD)
Larger size of farm	9.71	2.35
Middle size of farm	16.24	2.38
Small size of farm	13.91	2.43

Appendix 31: 23rd Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 23 **1 USD : Rp 8,400.00** **Price of BW/Box: USD 8.33**

Total BW : **29.00 Box**

Month:	***Feb-01***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total Sales (I+II)**				**Total Cost**	**Total Revenue**
			Co	**Price/kg**	**Total I**	**Co**	**Price/kg**	**Total II**		**BW**	**Papzol**	**CaCo3**		
	(Ha)	**(Box)**	**(Kg)**	**(USD)**	**(USD)**	**(Kg)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**
2042	0.30	0.25	8.00	2.40	19.16	0.00	0.18	0.00	19.16	2.08	0.33	0.03	2.44	16.72
3009	0.30	0.50	11.00	2.40	26.44	4.30	0.18	0.77	27.21	4.17	0.33	0.06	4.55	22.65
3004	0.30	0.25	2.70	2.47	6.68	0.00	0.18	0.00	6.68	2.08	0.00	0.03	2.11	4.57
2038	0.35	0.25	3.00	2.32	6.95	2.00	0.18	0.36	7.30	2.08	0.33	0.03	2.44	4.86
2007	0.35	0.50	10.00	2.45	24.47	1.00	0.18	0.18	24.65	4.17	0.33	0.06	4.55	20.09
2001	0.40	0.25	6.50	2.52	16.40	0.00	0.18	0.00	16.40	2.08	0.33	0.03	2.44	13.96
2049	0.45	0.25	1.60	2.40	3.83	1.00	0.18	0.18	4.01	2.08	0.33	0.03	2.44	1.57
1028	0.50	0.50	15.50	2.62	40.57	1.00	0.18	0.18	40.74	4.17	0.33	0.06	4.55	36.19
1012	0.50	0.50	13.50	2.43	32.81	0.00	0.18	0.00	32.81	4.17	0.33	0.06	4.55	28.25
1013	0.50	0.50	6.60	2.62	17.27	0.00	0.18	0.00	17.27	4.17	0.65	0.06	4.88	12.39
1014	0.50	0.50	3.00	2.39	7.16	0.00	0.18	0.00	7.16	4.17	0.00	0.06	4.23	2.93
1016	0.50	0.25	6.20	1.87	11.57	1.70	0.18	0.30	11.88	2.08	0.00	0.03	2.11	9.76
1019	0.50	0.25	8.00	2.40	19.16	0.00	0.18	0.00	19.16	2.08	0.00	0.03	2.11	17.05
2028	0.50	0.25	6.50	2.40	15.57	0.00	0.18	0.00	15.57	2.08	0.33	0.03	2.44	13.13
2029	0.50	0.25	1.70	2.40	4.07	3.00	0.18	0.54	4.61	2.08	0.00	0.03	2.11	2.49
2030	0.50	1.00	25.30	2.67	67.49	2.00	0.18	0.36	67.84	8.33	0.65	0.12	9.11	58.74
2031	0.50	0.50	13.80	2.53	34.94	1.20	0.18	0.21	35.15	4.17	0.33	0.06	4.55	30.60
2032	0.50	0.50	5.50	2.40	13.17	0.00	0.18	0.00	13.17	4.17	0.33	0.06	4.55	8.62
2033	0.50	0.50	8.60	2.39	20.52	0.00	0.18	0.00	20.52	4.17	0.33	0.06	4.55	15.96
2035	0.50	0.50	0.20	2.04	0.41	0.20	0.18	0.04	0.44	4.17	0.33	0.06	4.55	-4.11
4018	0.50	0.50	10.30	2.53	26.08	0.20	0.18	0.04	26.11	4.17	0.33	0.06	4.55	21.56
4019	0.50	0.25	6.40	2.49	15.92	0.30	0.18	0.05	15.97	2.08	0.16	0.03	2.28	13.69
2063	0.50	0.50	11.50	2.49	28.60	0.70	0.18	0.13	28.72	4.17	0.33	0.06	4.55	24.17
2006	0.50	0.75	8.20	2.11	17.32	2.50	0.18	0.45	17.77	6.25	0.65	0.09	6.99	10.77
2017	0.50	0.50	7.00	2.28	15.94	3.00	0.18	0.54	16.48	4.17	0.33	0.06	4.55	11.92
2019	0.50	0.25	3.50	2.40	8.41	2.00	0.18	0.36	8.77	2.08	0.33	0.03	2.44	6.33
2020	0.50	0.50	12.20	2.67	32.54	0.00	0.18	0.00	32.54	4.17	0.33	0.06	4.55	27.99

Appendix 31: 23rd Yield fresh cocoons (continue)

2041	0.50	0.25	10.50	2.65	27.87	1.00	0.18	0.18	28.04	2.08	0.33	0.03	2.44	25.60
2043	0.50	0.50	10.50	2.52	26.49	0.60	0.18	0.11	26.60	4.17	0.33	0.06	4.55	22.04
2044	0.50	0.50	8.10	2.32	18.76	1.90	0.18	0.34	19.09	4.17	0.33	0.06	4.55	14.54
2045	0.50	0.50	15.10	2.28	34.39	1.40	0.18	0.25	34.64	4.17	0.33	0.06	4.55	30.08
2046	0.50	0.50	13.50	2.20	29.65	3.20	0.18	0.57	30.22	4.17	0.33	0.06	4.55	25.66
2047	0.50	0.50	3.00	2.28	6.83	0.70	0.18	0.13	6.96	4.17	0.33	0.06	4.55	2.40
2048	0.50	0.50	10.00	2.40	24.03	1.40	0.18	0.25	24.28	4.17	0.00	0.06	4.23	20.06
2050	0.50	0.75	21.10	2.70	57.02	0.40	0.18	0.07	57.09	6.25	0.65	0.09	6.99	50.10
2052	0.50	0.25	7.70	2.49	19.15	2.20	0.18	0.39	19.54	2.08	0.16	0.03	2.28	17.27
2053	0.50	0.50	6.00	2.08	12.47	1.00	0.18	0.18	12.65	4.17	0.33	0.06	4.55	8.10
2061	0.50	1.00	5.50	2.32	12.74	0.30	0.18	0.05	12.79	8.33	0.65	0.12	9.11	3.68
4009	1.00	0.50	12.00	2.65	31.85	1.50	0.18	0.27	32.11	4.17	0.33	0.06	4.55	27.56
4010	1.00	1.00	6.40	2.40	15.38	0.00	0.18	0.00	15.38	8.33	0.00	0.12	8.45	6.93
4013	1.00	0.50	14.50	2.36	34.21	1.00	0.18	0.18	34.38	4.17	0.33	0.06	4.55	29.83
4014	1.00	0.25	3.00	2.24	6.71	0.30	0.18	0.05	6.76	2.08	0.33	0.03	2.44	4.32
1018	1.25	0.50	9.30	2.20	20.42	1.50	0.18	0.27	20.69	4.17	0.33	0.06	4.55	16.14
1050	1.50	0.25	7.00	2.28	15.94	0.30	0.18	0.05	15.99	2.08	0.33	0.03	2.44	13.55
2057	1.50	0.50	5.50	2.08	11.44	0.40	0.18	0.07	11.51	4.17	0.33	0.06	4.55	6.95
4008	1.50	0.50	10.20	2.28	23.23	0.20	0.18	0.04	23.26	4.17	0.33	0.06	4.55	18.71
4020	1.50	1.00	23.30	2.40	56.00	1.50	0.18	0.27	56.27	8.33	0.65	0.12	9.11	47.16
1021	2.00	1.00	15.00	2.40	35.93	0.00	0.18	0.00	35.93	8.33	0.65	0.12	9.11	26.82
1026	3.00	2.75	22.10	2.24	49.40	3.00	0.18	0.54	49.93	22.92	0.00	0.33	23.24	26.69
5001	3.00	3.00	42.50	2.57	109.24	0.00	0.18	0.00	109.24	25.00	1.96	0.36	27.32	81.92
Total	**37.20**	**29.00**	**498.10**		**1,212.57**	**49.90**		**8.91**	**1,221.48**	**241.67**	**17.35**	**3.45**	**262.47**	**959.01**

BW : **Baby worms** — ***Average price of fresh cocoons /kg*** — **2.39 USD**

Co : **Cocoons** — ***Average productions of fresh cocoons /box*** — **17.18 Kg**

	Average	
	Cocoons/box (Kg)	Price of cocoons/kg (USD)
Larger size of farm	14.54	2.34
Middle size of farm	18.97	2.40
Small size of farm	19.02	2.42

Appendix 32: 24th Yield fresh cocoons

Banyumas Sutera Alam
Harvest season 24 **1 USD : Rp 8,400.00** **Price of BW/Box: USD 10.71**
Total BW : **19.63 Box**

Month:	***Mar-01***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total**				**Total**	**Total**
			Co	**Price/kg**	**Total I**	**Co**	**Price/kg**	**Total II**	**Sales (I+II)**	**BW**	**Papzol**	**CaCo3**	**Cost**	**Revenue**
	(Ha)	**(Box)**	**(Kg)**	**(USD)**	**(USD)**	**(Kg)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**
1027	0.25	0.25	1.60	2.40	3.85	0.00	0.18	0.00	3.85	2.68	0.03	0.00	2.71	1.14
1049	0.25	0.50	9.50	2.40	22.83	1.60	0.18	0.29	23.12	5.36	0.36	0.00	5.71	17.40
1009	0.30	0.75	11.20	2.36	26.45	1.50	0.18	0.27	26.72	8.04	0.36	0.00	8.39	18.32
1020	0.30	0.50	2.20	2.36	5.19	2.00	0.18	0.36	5.55	5.36	0.19	0.00	5.55	0.00
2002	0.30	0.75	11.50	2.62	30.10	1.80	0.18	0.32	30.42	8.04	0.00	0.00	8.04	22.38
2003	0.30	0.50	5.50	2.31	12.70	0.20	0.18	0.04	12.73	5.36	0.36	0.00	5.71	7.02
2008	0.30	0.25	3.80	2.20	8.34	0.20	0.18	0.04	8.38	2.68	0.36	0.00	3.04	5.34
2009	0.30	0.50	7.60	2.36	17.93	2.50	0.18	0.45	18.38	5.36	0.36	0.00	5.71	12.66
2004	0.30	0.25	3.40	2.53	8.61	0.50	0.18	0.09	8.70	2.68	0.36	0.00	3.04	5.66
1047	0.50	0.50	10.50	2.65	27.87	2.30	0.18	0.41	28.28	5.36	0.36	0.00	5.71	22.56
1012	0.50	0.50	7.00	2.52	17.66	1.50	0.18	0.27	17.93	5.36	0.36	0.00	5.71	12.21
1013	0.50	0.75	13.00	2.36	30.67	2.80	0.18	0.50	31.17	8.04	0.71	0.00	8.75	22.42
1014	0.50	0.50	13.90	2.40	33.41	0.20	0.18	0.04	33.44	5.36	0.36	0.00	5.71	27.73
1016	0.50	0.25	4.90	2.18	10.71	1.20	0.18	0.21	10.92	2.68	0.18	0.00	2.86	8.06
1019	0.50	0.50	14.50	2.40	34.85	0.80	0.18	0.14	34.99	5.36	0.36	0.00	5.71	29.28
2028	0.50	0.25	0.70	2.35	1.65	0.20	0.18	0.04	1.68	2.68	0.00	0.00	2.68	-1.00
2029	0.50	0.25	8.10	2.23	18.04	1.00	0.18	0.18	18.22	2.68	0.18	0.00	2.86	15.36
2030	0.50	0.25	5.80	2.36	13.68	0.20	0.18	0.04	13.72	2.68	0.18	0.00	2.86	10.86
2031	0.50	0.50	11.70	2.24	26.15	1.80	0.18	0.32	26.47	5.36	0.00	0.00	5.36	21.12
2032	0.50	0.38	8.60	2.31	19.85	2.00	0.18	0.36	20.21	4.02	0.36	0.00	4.38	15.84
2033	0.50	1.00	10.20	2.36	24.06	1.50	0.18	0.27	24.33	10.71	0.71	0.00	11.43	12.90
2035	0.50	0.50	10.60	2.35	24.93	4.00	0.18	0.71	25.64	5.36	0.36	0.00	5.71	19.93
4018	0.50	0.25	2.80	2.40	6.71	0.20	0.18	0.04	6.74	2.68	0.00	0.00	2.68	4.06
7011	0.50	0.25	4.40	2.19	9.66	1.20	0.18	0.21	9.87	2.68	0.00	0.00	2.68	7.19
7013	0.50	0.75	11.50	2.28	26.19	1.20	0.18	0.21	26.40	8.04	0.71	0.00	8.75	17.65
2063	0.50	0.75	5.60	2.35	13.17	1.80	0.18	0.32	13.49	8.04	0.71	0.00	8.75	4.74
2006	0.50	3.00	29.10	1.37	39.72	32.00	0.18	5.71	45.44	32.14	2.14	0.00	34.29	11.15
1018	1.25	0.75	3.90	1.95	7.60	0.00	0.18	0.00	7.60	8.04	0.00	0.00	8.04	-0.44
1050	1.50	0.50	5.00	2.27	11.37	1.30	0.18	0.23	11.60	5.36	0.36	0.00	5.71	5.88
2057	1.50	1.00	16.10	2.35	37.86	3.20	0.18	0.57	38.43	10.71	0.71	0.00	11.43	27.00
4008	1.50	0.50	3.70	2.31	8.54	2.00	0.18	0.36	8.90	5.36	0.36	0.00	5.71	3.19
5001	3.00	1.50	15.00	2.57	38.56	6.30	0.18	1.13	39.68	16.07	1.07	0.00	17.14	22.54
Total	**20.35**	**19.63**	**272.90**		**618.88**	**79.00**		**14.11**	**632.99**	**210.27**	**12.54**	**0.00**	**222.81**	**410.18**

BW : Baby worms ***Average price of fresh cocoons /kg*** **2.32 USD**
Co : Cocoons ***Average productions of fresh cocoons /box*** **13.91 Kg**

	Average	
	Cocoons/box (Kg)	**Price of cocoons/kg (USD)**
Larger size of farm	10.28	2.29
Middle size of farm	15.54	2.29
Small size of farm	13.25	2.39

Appendix 33: 25th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 25 **1 USD : Rp 8,400.00** **Price of BW/Box: USD 10.71**

Total BW : **19.00 Box**

Month:	***May-01***		**Sales**							**Cost**				**Total Revenue (USD)**
ID	**Land (Ha)**	**BW (Box)**	**fresh cocoons (good quality)**			**poor quality**			**Total Sales (I+II) (USD)**	**BW (USD)**	**Papzol (USD)**	**CaCo3 (USD)**	**Total Cost (USD)**	
			Co (Kg)	**Price/kg (USD)**	**Total I (USD)**	**Co (Kg)**	**Price/kg (USD)**	**Total II (USD)**						
2002	0.30	0.13	3.60	2.12	7.62	0.50	0.18	0.09	7.71	1.34	0.09	0.01	1.44	6.26
2003	0.30	0.25	6.20	2.62	16.23	0.10	0.18	0.02	16.24	2.68	0.18	0.03	2.89	13.36
2004	0.30	0.50	9.20	2.43	22.36	1.80	0.18	0.32	22.68	5.36	0.36	0.06	5.77	16.90
2008	0.30	0.50	11.00	2.23	24.50	2.00	0.18	0.36	24.85	5.36	0.36	0.06	5.77	19.08
2009	0.30	0.25	1.50	2.20	3.29	0.40	0.18	0.07	3.37	2.68	0.18	0.03	2.89	0.48
2034	0.30	0.50	10.60	2.32	24.54	0.80	0.18	0.14	24.69	5.36	0.36	0.06	5.77	18.91
3003	0.30	0.13	4.00	2.23	8.93	0.50	0.18	0.09	9.02	1.34	0.09	0.01	1.44	7.57
3004	0.30	0.13	3.00	2.44	7.32	0.30	0.18	0.05	7.38	1.34	0.09	0.01	1.44	5.93
3009	0.30	0.13	4.60	2.53	11.65	0.10	0.18	0.02	11.66	1.34	0.09	0.01	1.44	10.22
2007	0.35	0.25	4.10	2.27	9.32	1.50	0.18	0.27	9.59	2.68	0.18	0.03	2.89	6.70
2038	0.35	0.25	4.50	2.19	9.88	0.10	0.18	0.02	9.89	2.68	0.18	0.03	2.89	7.01
2042	0.38	0.25	2.80	2.40	6.71	0.10	0.18	0.02	6.72	2.68	0.18	0.03	2.89	3.84
2001	0.40	0.25	3.20	2.32	7.41	0.10	0.18	0.02	7.43	2.68	0.18	0.03	2.89	4.54
2049	0.45	0.50	3.00	2.27	6.80	1.40	0.18	0.25	7.05	5.36	0.36	0.06	5.77	1.27
1047	0.50	0.50	9.20	2.24	20.56	0.80	0.18	0.14	20.71	5.36	0.36	0.06	5.77	14.93
1012	0.50	0.50	4.00	2.31	9.23	1.50	0.18	0.27	9.50	5.36	0.36	0.06	5.77	3.73
1013	0.50	0.33	1.50	2.32	3.47	0.50	0.18	0.09	3.56	3.56	0.18	0.04	3.78	-0.22
1014	0.50	0.50	4.10	2.43	9.96	1.40	0.18	0.25	10.21	5.36	0.36	0.06	5.77	4.44
1016	0.50	0.25	7.20	2.32	16.70		0.18	0.00	16.70	2.68	0.18	0.03	2.89	13.82
1019	0.50	0.50	9.00	2.36	21.23	1.20	0.18	0.21	21.45	5.36	0.36	0.06	5.77	15.67
2028	0.50	0.50	5.30	2.40	12.70	1.30	0.18	0.23	12.93	5.36	0.36	0.06	5.77	7.15
2029	0.50	0.50	8.40	2.35	19.75	0.40	0.18	0.07	19.82	5.36	0.36	0.06	5.77	14.05
2030	0.50	0.50	11.00	2.24	24.59	1.50	0.18	0.27	24.86	5.36	0.36	0.06	5.77	19.08
2031	0.50	0.50	3.70	2.08	7.69	0.50	0.18	0.09	7.78	5.36	0.36	0.06	5.77	2.01
2032	0.50	0.25	6.50	2.40	15.57	0.20	0.18	0.04	15.61	2.68	0.18	0.03	2.89	12.72
2033	0.50	0.50	11.30	1.95	22.02	3.30	0.18	0.59	22.61	5.36	0.36	0.06	5.77	16.83
2035	0.50	1.00	12.30	2.27	27.96	4.70	0.18	0.84	28.80	10.71	0.71	0.12	11.55	17.25

Appendix 33: 25th Yield fresh cocoons (continue)

4018	0.50	0.33	3.90	2.31	9.00	1.30	0.18	0.23	9.24	3.54	0.18	0.04	3.75	5.48
7011	0.50	0.13	0.80	2.27	1.81	0.70	0.18	0.13	1.94	1.39	0.09	0.02	1.50	0.44
7013	0.50	0.50	7.30	2.49	18.15	0.30	0.18	0.05	18.21	5.36	0.36	0.06	5.77	12.43
2063	0.50	0.25	3.70	2.35	8.70	0.40	0.18	0.07	8.77	2.68	0.18	0.03	2.89	5.89
2006	0.50	0.33	5.00	2.44	12.20	0.70	0.18	0.13	12.33	3.54	0.18	0.04	3.75	8.58
2017	0.50	0.33	5.20	2.19	11.39	0.70	0.18	0.13	11.52	3.54	0.18	0.04	3.75	7.76
2019	0.50	0.25	4.00	2.62	10.47	0.60	0.18	0.11	10.58	2.68	0.18	0.03	2.89	7.69
2020	0.50	0.33	11.80	2.24	26.38	1.30	0.18	0.23	26.61	3.54	0.18	0.04	3.75	22.85
2024	0.50	0.25	6.90	2.40	16.53	1.50	0.18	0.27	16.80	2.68	0.18	0.03	2.89	13.91
2025	0.50	0.25	5.20	2.31	12.01	0.70	0.18	0.13	12.13	2.68	0.18	0.03	2.89	9.24
4009	1.00	0.50	7.30	2.24	16.32	1.00	0.18	0.18	16.50	5.36	0.36	0.06	5.77	10.72
4010	1.00	0.31	2.30	1.82	4.18	0.20	0.18	0.04	4.22	3.32	0.18	0.04	3.54	0.68
4013	1.00	0.50	8.00	2.28	18.22	1.30	0.18	0.23	18.45	5.36	0.36	0.06	5.77	12.68
4014	1.00	0.25	7.50	2.56	19.17	1.00	0.18	0.18	19.35	2.68	0.18	0.03	2.89	16.46
1018	1.25	0.50	7.10	2.40	17.01	1.50	0.18	0.27	17.27	5.36	0.36	0.06	5.77	11.50
4008	1.50	0.50	10.60	2.53	26.84	0.20	0.18	0.04	26.87	5.36	0.36	0.06	5.77	21.10
4020	1.50	0.50	12.00	2.36	28.31	6.20	0.18	1.11	29.42	5.36	0.36	0.06	5.77	23.64
1050	1.50	1.00	13.40	2.40	32.10	3.20	0.18	0.57	32.67	10.71	0.71	0.12	11.55	21.12
2057	1.50	0.33	5.90	2.35	13.87	0.50	0.18	0.09	13.96	3.54	0.18	0.04	3.75	10.21
1021	2.00	0.33	2.70	2.15	5.82	0.40	0.18	0.07	5.89	3.54	0.18	0.04	3.75	2.14
1026	3.00	1.00	11.70	2.49	29.10	0.70	0.18	0.13	29.22	10.71	0.71	0.12	11.55	17.67
Total	**32.38**	**19.00**	**307.10**		**715.56**	**51.40**		**9.18**	**724.74**	**203.60**	**13.13**	**2.26**	**218.99**	**505.75**

BW : **Baby worms** ***Average price of fresh cocoons /kg*** **2.32 USD**

Co : **Cocoons** ***Average productions of fresh cocoons /box*** **16.16 Kg**

	Average	
	Cocoons/box (Kg)	Price of cocoons/kg (USD)
Larger size of farm	15.47	2.32
Middle size of farm	15.87	2.32
Small size of farm	17.83	2.33

Appendix 34: 26th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 26 **1 USD : Rp8,400.00**

Total BW : **18.90 Box** **Price of BW/Box: USD 10.71**

Month	***Jun-01***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total**				**Total**	**Total**
			Co	**Price/kg**	**Total I**	**Co**	**Price/kg**	**Total II**	**Sales (I+II)**	**BW**	**Papzol**	**CaCo3**	**Cost**	**Revenue**
	(Ha)	**(Box)**	**(Kg)**	**(USD)**	**(USD)**	**(Kg)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**
3009	0.30	0.50	8.40	2.35	19.75	0.40	0.18	0.07	19.82	5.36	0.36	0.06	5.77	14.05
3004	0.30	1.00	17.90	2.23	39.86	3.40	0.18	0.61	40.47	10.71	0.71	0.12	11.55	28.92
2007	0.35	0.50	6.00	2.24	13.41	1.20	0.18	0.21	13.63	5.36	0.36	0.06	5.77	7.85
1028	0.50	0.25	1.50	2.20	3.29	0.40	0.18	0.07	3.37	2.68	0.18	0.03	2.89	0.48
1012	0.50	0.50	10.60	2.32	24.54	0.80	0.18	0.14	24.69	5.36	0.36	0.06	5.77	18.91
1013	0.50	0.50	7.10	2.40	17.01	1.50	0.18	0.27	17.27	5.36	0.36	0.06	5.77	11.50
1014	0.50	0.25	4.10	2.27	9.32	1.50	0.18	0.27	9.59	2.68	0.18	0.03	2.89	6.70
1016	0.50	0.25	4.00	2.23	8.93	0.50	0.18	0.09	9.02	2.68	0.18	0.03	2.89	6.13
1019	0.50	0.25	4.60	2.53	11.65	0.10	0.18	0.02	11.66	2.68	0.18	0.03	2.89	8.78
2028	0.50	0.25	1.60	2.40	3.83	2.60	0.18	0.46	4.30	2.68	0.18	0.03	2.89	1.41
2029	0.50	0.50	3.00	2.27	6.80	1.40	0.18	0.25	7.05	5.36	0.36	0.06	5.77	1.27
2030	0.50	0.25	4.50	2.19	9.88	0.10	0.18	0.02	9.89	2.68	0.18	0.03	2.89	7.01
2031	0.50	0.25	3.00	2.44	7.32	0.30	0.18	0.05	7.38	2.68	0.18	0.03	2.89	4.49
2032	0.50	0.25	6.20	2.62	16.23	0.10	0.18	0.02	16.24	2.68	0.18	0.03	2.89	13.36
2033	0.50	0.25	2.50	2.12	5.29	0.50	0.18	0.09	5.38	2.68	0.18	0.03	2.89	2.49
2035	0.50	0.25	3.20	2.32	7.41	0.10	0.18	0.02	7.43	2.68	0.18	0.03	2.89	4.54
4018	0.50	0.25	7.30	2.49	18.15	0.30	0.18	0.05	18.21	2.68	0.18	0.03	2.89	15.32
4019	0.50	0.50	9.20	2.24	20.56	0.80	0.18	0.14	20.71	5.36	0.36	0.06	5.77	14.93
2063	0.50	0.50	4.00	2.31	9.23	1.50	0.18	0.27	9.50	5.36	0.36	0.06	5.77	3.73
2006	0.50	0.25	6.50	2.40	15.57	0.20	0.18	0.04	15.61	2.68	0.18	0.03	2.89	12.72
2017	0.50	0.50	9.20	2.43	22.36	1.80	0.18	0.32	22.68	5.36	0.36	0.06	5.77	16.90
2019	0.50	0.50	10.10	2.53	25.57	0.20	0.18	0.04	25.61	5.36	0.36	0.06	5.77	19.83
2020	0.50	0.25	1.20	2.32	2.78	0.00	0.18	0.00	2.78	2.68	0.18	0.03	2.89	-0.10
2041	0.50	0.50	9.00	2.36	21.23	1.20	0.18	0.21	21.45	5.36	0.36	0.06	5.77	15.67
2043	0.50	0.50	5.30	2.40	12.70	1.30	0.18	0.23	12.93	5.36	0.36	0.06	5.77	7.15
2044	0.50	0.50	11.00	2.24	24.59	1.50	0.18	0.27	24.86	5.36	0.36	0.06	5.77	19.08
2045	0.50	0.50	3.70	2.08	7.69	0.50	0.18	0.09	7.78	5.36	0.36	0.06	5.77	2.01

Appendix 34: 26th Yield fresh cocoons (continue)

2046	0.50	1.00	12.30	2.27	27.96	4.70	0.18	0.84	28.80	10.71	0.71	0.12	11.55	17.25
2047	0.50	0.33	3.90	2.31	9.00	1.30	0.18	0.23	9.24	3.54	0.24	0.04	3.81	5.43
2048	0.50	0.33	5.00	2.44	12.20	0.70	0.18	0.13	12.33	3.54	0.24	0.04	3.81	8.52
2050	0.50	0.33	5.20	2.19	11.39	0.70	0.18	0.13	11.52	3.54	0.24	0.04	3.81	7.71
2052	0.50	0.25	4.00	2.62	10.47	0.60	0.18	0.11	10.58	2.68	0.18	0.03	2.89	7.69
2053	0.50	0.25	11.80	2.24	26.38	1.30	0.18	0.23	26.61	2.68	0.18	0.03	2.89	23.72
2061	0.50	0.25	5.50	2.40	13.17	1.50	0.18	0.27	13.44	2.68	0.18	0.03	2.89	10.56
4009	1.00	0.25	2.70	2.19	5.92	0.70	0.18	0.13	6.04	2.68	0.18	0.03	2.89	3.15
4010	1.00	0.25	5.20	2.31	12.01	0.70	0.18	0.13	12.13	2.68	0.18	0.03	2.89	9.24
4013	1.00	0.50	7.30	2.24	16.32	1.00	0.18	0.18	16.50	5.36	0.36	0.06	5.77	10.72
4014	1.00	0.25	2.30	1.82	4.18	0.20	0.18	0.04	4.22	2.68	0.18	0.03	2.89	1.33
2010	1.00	0.25	7.50	2.56	19.17	1.00	0.18	0.18	19.35	2.68	0.18	0.03	2.89	16.46
1001	1.00	0.25	3.70	2.35	8.70	0.40	0.18	0.07	8.77	2.68	0.18	0.03	2.89	5.89
1010	1.00	0.33	5.90	2.35	13.87	0.50	0.18	0.09	13.96	3.54	0.24	0.04	3.81	10.15
1002	1.00	0.33	2.70	2.15	5.82	0.40	0.18	0.07	5.89	3.54	0.24	0.04	3.81	2.08
1006	1.00	0.50	11.70	2.49	29.10	0.70	0.18	0.13	29.22	5.36	0.36	0.06	5.77	23.45
1018	1.25	0.50	8.00	2.28	18.22	1.30	0.18	0.23	18.45	5.36	0.36	0.06	5.77	12.68
4020	1.50	1.00	13.40	2.40	32.10	3.20	0.18	0.57	32.67	10.71	0.71	0.12	11.55	21.12
2057	1.50	1.00	11.30	1.95	22.02	3.30	0.18	0.59	22.61	10.71	0.71	0.12	11.55	11.06
Total	**29.70**	**18.90**	**294.10**		**682.95**	**48.40**		**8.64**	**691.59**	**202.50**	**13.50**	**2.25**	**218.25**	**473.34**

BW : **Baby worms** — ***Average price of fresh cocoons /kg*** — **2.31 USD**

Co : **Cocoons** — ***Average productions of fresh cocoons /box*** — **15.56 Kg**

	Average	
	Cocoons/box (Kg)	Price of cocoons/kg (USD)
Larger size of farm	15.10	2.26
Middle size of farm	15.67	2.34
Small size of farm	16.15	2.27

Appendix 35: 27th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 27 **1 USD : Rp 8,400.00**

Total BW : **17.29 Box** **Price of BW/Box: USD 10.71**

Month:	***Jul-01***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total**				**Total**	**Total**
			Co	**Price/kg**	**Total I**	**Co**	**Price/kg**	**Total II**	**Sales (I+II)**	**BW**	**Papzol**	**CaCo3**	**Cost**	**Revenue**
	(Ha)	**(Box)**	**(Kg)**	**(USD)**	**(USD)**	**(Kg)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**
2015	0.20	0.50	5.00	2.28	11.39	0.10	0.18	0.02	11.40	5.36	0.36	0.06	5.77	5.63
2022	0.20	0.63	18.80	2.19	41.26	3.60	0.18	0.64	41.90	6.70	0.45	0.07	7.22	34.69
2058	0.20	0.50	10.60	2.32	24.54	1.50	0.18	0.27	24.81	5.36	0.36	0.06	5.77	19.04
1027	0.25	0.25	4.60	2.40	11.02	0.40	0.18	0.07	11.09	2.68	0.18	0.03	2.89	8.20
1049	0.25	0.50	10.80	2.32	25.01	2.50	0.18	0.45	25.45	5.36	0.36	0.06	5.77	19.68
1009	0.30	0.25	2.90	2.24	6.48	0.10	0.18	0.02	6.50	2.68	0.18	0.03	2.89	3.61
1020	0.30	0.25	9.70	2.35	22.81	0.70	0.18	0.13	22.94	2.68	0.18	0.03	2.89	20.05
1012	0.50	0.50	9.30	2.49	23.13	1.80	0.18	0.32	23.45	5.36	0.36	0.06	5.77	17.68
1013	0.50	0.50	4.70	2.23	10.49	0.50	0.18	0.09	10.58	5.36	0.36	0.06	5.77	4.80
1014	0.50	0.25	6.00	2.44	14.65	0.00	0.18	0.00	14.65	2.68	0.18	0.03	2.89	11.76
1016	0.50	0.33	3.90	2.27	8.87	1.80	0.18	0.32	9.19	3.54	0.24	0.04	3.81	5.38
1019	0.50	0.25	3.10	2.15	6.67	0.10	0.18	0.02	6.69	2.68	0.18	0.03	2.89	3.81
2006	0.50	0.25	3.70	2.31	8.54	1.20	0.18	0.21	8.76	2.68	0.18	0.03	2.89	5.87
2017	0.50	0.25	5.10	2.40	12.22	0.50	0.18	0.09	12.31	2.68	0.18	0.03	2.89	9.42
2019	0.50	0.50	9.50	2.35	22.34	2.00	0.18	0.36	22.70	5.36	0.36	0.06	5.77	16.92
2020	0.50	0.25	3.90	2.40	9.34	0.30	0.18	0.05	9.40	2.68	0.18	0.03	2.89	6.51
2024	0.50	0.25	3.80	2.40	9.10	0.40	0.18	0.07	9.17	2.68	0.18	0.03	2.89	6.29
2025	0.50	0.25	3.30	2.08	6.86	0.20	0.18	0.04	6.89	2.68	0.18	0.03	2.89	4.01
2026	0.50	0.25	3.20	2.32	7.41	0.50	0.18	0.09	7.50	2.68	0.18	0.03	2.89	4.61
2027	0.50	0.25	3.70	2.27	8.41	0.50	0.18	0.09	8.50	2.68	0.18	0.03	2.89	5.61
2052	0.50	0.25	6.40	2.24	14.32	0.00	0.18	0.00	14.32	2.68	0.18	0.03	2.89	11.43
2053	0.50	0.50	5.60	2.28	12.75	0.10	0.18	0.02	12.77	5.36	0.36	0.06	5.77	7.00
2062	0.50	0.25	3.00	2.04	6.12	0.30	0.18	0.05	6.18	2.68	0.18	0.03	2.89	3.29

Appendix 35: 27th Yield fresh cocoons (continue)

2069	0.50	0.25	8.20	2.36	19.34	0.10	0.18	0.02	19.36	2.68	0.18	0.03	2.89	16.48
3002	0.50	0.25	8.30	2.32	19.22	0.20	0.18	0.04	19.25	2.68	0.18	0.03	2.89	16.37
3005	0.50	0.50	10.20	2.27	23.19	1.40	0.18	0.25	23.44	5.36	0.36	0.06	5.77	17.66
3006	0.50	0.50	9.60	2.24	21.46	0.80	0.18	0.14	21.60	5.36	0.36	0.06	5.77	15.83
3007	0.50	0.50	9.40	2.36	22.18	0.10	0.18	0.02	22.19	5.36	0.36	0.06	5.77	16.42
3008	0.50	0.33	7.70	2.36	18.16	2.00	0.18	0.36	18.52	3.54	0.24	0.04	3.81	14.71
4009	1.00	0.25	4.40	2.27	10.00	1.00	0.18	0.18	10.18	2.68	0.18	0.03	2.89	7.29
4010	1.00	0.50	12.00	2.52	30.27	1.20	0.18	0.21	30.49	5.36	0.36	0.06	5.77	24.71
4013	1.00	0.50	8.00	2.20	17.57	0.10	0.18	0.02	17.59	5.36	0.36	0.06	5.77	11.81
4014	1.00	0.50	6.70	2.24	14.99	0.50	0.18	0.09	15.08	5.36	0.36	0.06	5.77	9.30
1018	1.25	1.00	12.10	2.19	26.56	2.00	0.18	0.36	26.91	10.71	0.71	0.12	11.55	15.37
1050	1.50	1.00	10.00	2.32	23.15	1.80	0.18	0.32	23.48	10.71	0.71	0.12	11.55	11.93
2057	1.50	0.50	8.00	2.32	18.52	1.00	0.18	0.18	18.70	5.36	0.36	0.06	5.77	12.93
4008	1.50	1.00	10.60	2.36	25.01	1.80	0.18	0.32	25.33	10.71	0.71	0.12	11.55	13.78
4020	1.50	0.50	8.60	2.35	20.22	1.40	0.18	0.25	20.47	5.36	0.36	0.06	5.77	14.70
1021	2.00	0.50	12.00	2.28	27.33	0.10	0.18	0.02	27.35	5.36	0.36	0.06	5.77	21.57
1026	3.00	0.25	4.00	2.23	8.93	0.40	0.18	0.07	9.00	2.68	0.18	0.03	2.89	6.11
5001	3.00	0.50	7.60	2.40	18.20	1.80	0.18	0.32	18.53	5.36	0.36	0.06	5.77	12.75
Total	**31.95**	**17.29**	**298.00**		**688.02**	**36.80**		**6.57**	**694.59**	**6.57**	**185.20**	**2.06**	**199.60**	**494.99**

BW : **Baby worms** ***Average price of fresh cocoons /kg*** **2.30 USD**

Co : **Cocoons** ***Average productions of fresh cocoons /bo*** **17.24 Kg**

	Average	
	Cocoons/box (Kg)	**Price of cocoons/kg (USD)**
Larger size of farr	14.86	2.31
Middle size of farr	17.76	2.30
Small size of farm	21.70	2.30

Appendix 36: 28th Yield fresh cocoons

Banyumas Sutera Alam
Harvest season 28 **1 USD : Rp 8,400.00**
Total BW : **13.00 Box** **Price of BW/Box: USD 10.71**

Month:	***Sep-01***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total**				**Total**	**Total**
			Co	**Price/kg**	**Total I**	**Co**	**Price/kg**	**Total II**	**Sales (I+II)**	**BW**	**Papzol**	**CaCo3**	**Cost**	**Revenue**
	(Ha)	**(Box)**	**(Kg)**	**(USD)**	**(USD)**	**(Kg)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	
1009	0.30	0.25	2.70	2.00	5.40	0.60	0.18	0.11	5.51	2.68	0.18	0.03	2.89	2.63
2008	0.30	0.25	1.40	2.12	2.96	0.50	0.18	0.09	3.05	2.68	0.18	0.03	2.89	0.17
2009	0.30	0.25	5.70	2.44	13.91	0.30	0.18	0.05	13.97	2.68	0.18	0.03	2.89	11.08
2034	0.30	0.25	3.10	2.32	7.18	0.70	0.18	0.13	7.30	2.68	0.18	0.03	2.89	4.42
3004	0.30	0.25	3.40	2.19	7.46	0.30	0.18	0.05	7.52	2.68	0.18	0.03	2.89	4.63
3003	0.30	0.25	4.00	2.49	9.95	0.20	0.18	0.04	9.98	2.68	0.18	0.03	2.89	7.10
2049	0.45	0.75	15.20	2.40	36.41	2.70	0.18	0.48	36.89	8.04	0.54	0.09	8.66	28.23
2039	0.50	0.25	1.40	2.35	3.29	0.10	0.18	0.02	3.31	2.68	0.18	0.03	2.89	0.42
2040	0.50	0.50	8.50	2.04	17.35	1.20	0.18	0.21	17.56	5.36	0.36	0.06	5.77	11.79
2041	0.50	0.25	1.20	2.12	2.54	0.10	0.18	0.02	2.56	2.68	0.18	0.03	2.89	-0.33
2043	0.50	0.75	15.20	2.40	36.41	2.00	0.18	0.36	36.77	8.04	0.54	0.09	8.66	28.11
2044	0.50	0.25	2.70	2.40	6.47		0.18	0.00	6.47	2.68	0.18	0.03	2.89	3.58
2045	0.50	0.25	2.00	2.24	4.47	0.70	0.18	0.13	4.60	2.68	0.18	0.03	2.89	1.71
2046	0.50	0.25	4.20	2.40	10.09	0.10	0.18	0.02	10.11	2.68	0.18	0.03	2.89	7.23
2047	0.50	0.25	5.70	2.44	13.91	0.30	0.18	0.05	13.97	2.68	0.18	0.03	2.89	11.08
2048	0.50	0.50	7.20	2.49	17.91	0.10	0.18	0.02	17.92	5.36	0.36	0.06	5.77	12.15
2050	0.50	0.25	4.60	2.27	10.46	0.50	0.18	0.09	10.55	2.68	0.18	0.03	2.89	7.66
2052	0.50	0.25	4.20	2.40	10.06	0.10	0.18	0.02	10.08	2.68	0.18	0.03	2.89	7.19
2053	0.50	0.50	9.80	2.49	24.37	0.60	0.18	0.11	24.48	5.36	0.36	0.06	5.77	18.71
3002	0.50	0.25	3.20	2.00	6.41	1.50	0.18	0.27	6.67	2.68	0.18	0.03	2.89	3.79
2023	1.00	1.00	12.00	2.19	26.34	0.00	0.18	0.00	26.34	10.71	0.71	0.12	11.55	14.79
2037	1.00	0.50	9.30	2.28	21.18	0.10	0.18	0.02	21.20	5.36	0.36	0.06	5.77	15.42
2051	1.00	0.25	1.60	2.27	3.64	0.20	0.18	0.04	3.67	2.68	0.18	0.03	2.89	0.79
3001	1.00	1.50	24.85	2.08	51.67	5.00	0.18	0.89	52.57	16.07	1.07	0.18	17.32	35.24
3010	1.00	0.25	3.30	2.24	7.38	0.30	0.18	0.05	7.43	2.68	0.18	0.03	2.89	4.54
4001	1.00	0.25	2.80	2.00	5.61	0.10	0.18	0.02	5.62	2.68	0.18	0.03	2.89	2.74
4002	1.00	0.50	6.40	2.08	13.30	1.00	0.18	0.18	13.48	5.36	0.36	0.06	5.77	7.71
4003	1.00	0.50	10.50	1.87	19.60	2.00	0.18	0.36	19.96	5.36	0.36	0.06	5.77	14.18
4004	1.00	0.50	11.30	2.49	28.10	0.60	0.18	0.11	28.21	5.36	0.36	0.06	5.77	22.44
4005	1.00	0.50	7.00	2.24	15.65	0.60	0.18	0.11	15.75	5.36	0.36	0.06	5.77	9.98
4006	1.00	0.50	6.10	2.36	14.39	0.30	0.18	0.05	14.44	5.36	0.36	0.06	5.77	8.67
Total	**19.75**	**13.00**	**200.55**		**453.86**	**22.80**		**4.07**	**457.93**	**139.29**	**9.29**	**1.55**	**150.12**	**307.81**

BW : Baby worms ***Average price of fresh cocoons /kg*** **2.26 USD**
Co : Cocoons ***Average productions of fresh cocoons /box*** **15.43 Kg**

	Average	
	Cocoons/box (Kg)	**Price of cocoons/kg (USD)**
Larger size of farm	15.22	2.19
Middle size of farm	15.53	2.31
Small size of farm	15.78	2.28

Appendix 37: 29th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 29 **1 USD : Rp 8,400.00**

Total BW : **11.00 Box** **Price of BW/Box: USD 10.71**

Month:	***Oct-01***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total**				**Total**	**Total**
			Co	**Price/kg**	**Total I**	**Co**	**Price/kg**	**Total II**	**Sales (I+II)**	**BW**	**Papzol**	**CaCo3**	**Cost**	**Revenue**
	(Ha)	**(Box)**	**(Kg)**	**(USD)**	**(USD)**	**(Kg)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**
2002	0.30	0.50	9.90	2.20	21.74	0.40	0.18	0.07	21.81	5.36	0.36	0.06	5.77	16.04
2003	0.30	0.50	7.10	2.24	15.87	0.80	0.18	0.14	16.01	5.36	0.36	0.06	5.77	10.24
2004	0.30	1.00	30.00	2.57	77.11	2.10	0.18	0.38	77.49	10.71	0.71	0.12	11.55	65.94
2008	0.30	0.25	2.80	2.28	6.38	0.00	0.18	0.00	6.38	2.68	0.18	0.03	2.89	3.49
2009	0.30	0.25	3.50	2.32	8.10	0.20	0.18	0.04	8.14	2.68	0.18	0.03	2.89	5.25
2034	0.30	0.50	5.70	2.44	13.91	0.20	0.18	0.04	13.95	5.36	0.36	0.06	5.77	8.18
3003	0.30	0.50	6.00	2.32	13.89	0.60	0.18	0.11	14.00	5.36	0.36	0.06	5.77	8.23
1013	0.50	0.25	2.20	2.24	4.92	0.10	0.18	0.02	4.94	2.68	0.18	0.03	2.89	2.05
1014	0.50	0.50	10.00	2.38	23.75	3.20	0.18	0.57	24.32	5.36	0.36	0.06	5.77	18.55
1016	0.50	0.50	6.00	2.40	14.42	0.50	0.18	0.09	14.51	5.36	0.36	0.06	5.77	8.74
1019	0.50	0.50	13.10	2.31	30.24	1.70	0.18	0.30	30.55	5.36	0.36	0.06	5.77	24.77
2028	0.50	0.25	4.90	2.24	10.95	0.80	0.18	0.14	11.10	2.68	0.18	0.03	2.89	8.21
2029	0.50	0.50	8.50	2.32	19.68	0.00	0.18	0.00	19.68	5.36	0.36	0.06	5.77	13.91
2030	0.50	0.50	6.40	2.40	15.38	0.10	0.18	0.02	15.40	5.36	0.36	0.06	5.77	9.63
2031	0.50	0.50	6.60	2.32	15.28	0.10	0.18	0.02	15.30	5.36	0.36	0.06	5.77	9.53
2032	0.50	0.25	4.80	2.24	10.73	0.20	0.18	0.04	10.76	2.68	0.18	0.03	2.89	7.88
2033	0.50	0.25	4.70	2.32	10.88	1.40	0.18	0.25	11.13	2.68	0.18	0.03	2.89	8.25
2035	0.50	0.50	6.50	2.08	13.51	3.20	0.18	0.57	14.08	5.36	0.36	0.06	5.77	8.31
1001	1.00	0.50	6.50	2.32	15.05	0.60	0.18	0.11	15.16	5.36	0.36	0.06	5.77	9.38
2057	1.50	0.50	10.70	2.49	26.61	0.10	0.18	0.02	26.63	5.36	0.36	0.06	5.77	20.85
1010	1.00	1.00	30.50	2.36	71.95	7.20	0.18	1.29	73.24	10.71	0.71	0.12	11.55	61.69
1002	1.00	0.50	10.70	2.19	23.48	1.00	0.18	0.18	23.66	5.36	0.36	0.06	5.77	17.89
1006	1.00	0.50	7.70	2.19	16.90	0.50	0.18	0.09	16.99	5.36	0.36	0.06	5.77	11.22
Total	**13.10**	**11.00**	**204.80**		**480.75**	**25.00**		**4.46**	**485.22**	**117.86**	**7.86**	**1.31**	**127.02**	**358.19**

BW : Baby worms ***Average price of fresh cocoons /kg*** **2.31 USD**

Co : Cocoons ***Average productions of fresh cocoons /box*** **18.62 Kg**

	Average	
	Cocoons/box (Kg)	**Price of cocoons/kg (USD)**
Larger size of farm	22.03	2.31
Middle size of farm	16.38	2.29
Small size of farm	18.57	2.34

Appendix 38: 30th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 30 **1 USD : Rp 8,400.00**

Total BW : **10.63 Box** **Price of BW/Box: USD 10.71**

Month:	***Nov-01***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total**				**Total Cost**	**Total Revenue**
			Co	**Price/kg**	**Total I**	**Co**	**Price/kg**	**Total II**	**Sales (I+II)**	**BW**	**Papzol**	**CaCo3**		
	(Ha)	**(Box)**	**(Kg)**	**(USD)**	**(USD)**	**(Kg)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**
2059	0.18	0.13	1.50	2.16	3.23	0.10	0.18	0.02	3.25	1.34	0.09	0.01	1.44	1.81
2058	0.20	0.50	9.50	2.28	21.63	1.80	0.18	0.32	21.96	5.36	0.36	0.06	5.77	16.18
3003	0.30	0.25	3.50	2.40	8.38	0.20	0.18	0.04	8.42	2.68	0.18	0.03	2.89	5.53
3004	0.30	0.25	4.50	2.40	10.78	2.20	0.18	0.39	11.17	2.68	0.18	0.03	2.89	8.29
3009	0.30	0.13	1.80	2.23	4.02	0.30	0.18	0.05	4.07	1.34	0.09	0.01	1.44	2.63
2038	0.35	0.25	4.20	2.12	8.89	1.00	0.18	0.18	9.07	2.68	0.18	0.03	2.89	6.18
2017	0.50	1.00	12.70	2.15	27.37	1.00	0.18	0.18	27.54	10.71	0.71	0.12	11.55	16.00
2019	0.50	0.50	10.40	2.40	24.91	0.90	0.18	0.16	25.07	5.36	0.36	0.06	5.77	19.30
2020	0.50	0.25	2.20	2.19	4.82	1.40	0.18	0.25	5.07	2.68	0.18	0.03	2.89	2.18
2024	0.50	0.25	4.20	2.44	10.25	0.10	0.18	0.02	10.27	2.68	0.18	0.03	2.89	7.38
2025	0.50	0.50	3.50	2.32	8.10	2.10	0.18	0.38	8.48	5.36	0.36	0.06	5.77	2.71
2026	0.50	0.50	9.00	2.24	20.12	0.60	0.18	0.11	20.22	5.36	0.36	0.06	5.77	14.45
2027	0.50	0.50	5.60	2.35	13.17	1.40	0.18	0.25	13.42	5.36	0.36	0.06	5.77	7.64
2052	0.50	0.25	3.20	2.15	6.90	0.40	0.18	0.07	6.97	2.68	0.18	0.03	2.89	4.08
2053	0.50	0.25	2.10	2.40	5.05	0.10	0.18	0.02	5.07	2.68	0.18	0.03	2.89	2.18
2062	0.50	0.25	1.50	2.35	3.53	0.20	0.18	0.04	3.56	2.68	0.18	0.03	2.89	0.68
2069	0.50	0.25	3.20	2.31	7.39	0.70	0.18	0.13	7.51	2.68	0.18	0.03	2.89	4.63
3002	0.50	0.25	5.40	2.27	12.28	0.50	0.18	0.09	12.36	2.68	0.18	0.03	2.89	9.48
4007	0.75	0.25	1.60	2.23	3.57	0.50	0.18	0.09	3.66	2.68	0.18	0.03	2.89	0.77
1018	1.25	0.13	2.40	2.27	5.46	0.20	0.18	0.04	5.49	1.34	0.09	0.01	1.44	4.05
1050	1.50	0.50	2.90	2.32	6.73		0.18	0.00	6.73	5.36	0.36	0.06	5.77	0.95
2057	1.50	1.00	9.50	2.32	22.00	0.40	0.18	0.07	22.07	10.71	0.71	0.12	11.55	10.52
4008	1.50	1.00	13.40	2.32	31.03	2.90	0.18	0.52	31.55	10.71	0.71	0.12	11.55	20.00
4020	1.50	0.50	9.40	2.31	21.70	2.80	0.18	0.50	22.20	5.36	0.36	0.06	5.77	16.43
1021	2.00	1.00	17.70	2.19	38.78	2.00	0.18	0.36	39.13	10.71	0.71	0.12	11.55	27.59
Total	**17.63**	**10.63**	**144.90**		**330.07**	**23.80**		**4.25**	**334.32**	**113.84**	**7.59**	**1.26**	**122.69**	**211.62**

BW : Baby worms ***Average price of fresh cocoons /kg*** **2.28 USD**

Co : Cocoons ***Average productions of fresh cocoons /box*** **13.64 Kg**

	Average	
	Cocoons/box (Kg)	**Price of cocoons/kg (USD)**
Larger size of farm	13.41	2.29
Middle size of farm	12.92	2.29
Small size of farm	16.67	2.26

Appendix 39: 31st Yield fresh cocoons

Banyumas Sutera Alam
Harvest season 31

1 USD : Rp 8,400.00
Total BW : **11.11 Box**

Price of BW/Box: USD 10.71

Month:	***Dec-01***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total**				**Total**	**Total**
			Co	**Price/kg**	**Total I**	**Co**	**Price/kg**	**Total II**	**Sales (I+II)**	**BW**	**Papzol**	**CaCo3**	**Cost**	**Revenue**
	(Ha)	**(Box)**	**(Kg)**	**(USD)**	**(USD)**	**(Kg)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**
1009	0.30	0.25	3.70	2.31	8.54	0.70	0.18	0.13	8.67	2.68	0.18	0.03	2.89	5.78
2008	0.30	0.50	2.30	2.32	5.33	1.00	0.18	0.18	5.50	5.36	0.36	0.06	5.77	-0.27
2009	0.30	0.25	1.30	2.27	2.96	0.70	0.18	0.13	3.08	2.68	0.18	0.03	2.89	0.19
2034	0.30	0.33	5.20	2.27	11.82	1.50	0.18	0.27	12.09	3.54	0.24	0.04	3.81	8.28
2024	0.30	0.33	4.70	2.28	10.70	0.60	0.18	0.11	10.81	3.54	0.24	0.04	3.81	7.00
2023	0.30	0.25	1.20	2.32	2.78	0.40	0.18	0.07	2.85	2.68	0.18	0.03	2.89	-0.04
2049	0.45	0.25	1.00	2.35	2.35	0.10	0.18	0.02	2.37	2.68	0.18	0.03	2.89	-0.52
2039	0.50	0.33	3.70	2.15	7.97	2.40	0.18	0.43	8.40	3.54	0.24	0.04	3.81	4.59
2040	0.50	0.33	7.10	2.40	17.01	0.30	0.18	0.05	17.06	3.54	0.24	0.04	3.81	13.25
2041	0.50	0.25	1.40	2.24	3.13	0.40	0.18	0.07	3.20	2.68	0.18	0.03	2.89	0.31
2044	0.50	0.50	4.20	2.35	9.88	1.80	0.18	0.32	10.20	5.36	0.36	0.06	5.77	4.42
2045	0.50	0.25	0.00	0.00	0.00	1.00	0.18	0.18	0.18	2.68	0.18	0.03	2.89	-2.71
2020	0.50	0.25	1.90	2.35	4.47	0.40	0.18	0.07	4.54	2.68	0.18	0.03	2.89	1.65
2047	0.50	0.25	1.40	2.15	3.02	0.40	0.18	0.07	3.09	2.68	0.18	0.03	2.89	0.20
2048	0.50	0.25	1.90	2.23	4.24	0.80	0.18	0.14	4.38	2.68	0.18	0.03	2.89	1.50
2032	0.50	0.25	2.50	2.24	5.59	0.50	0.18	0.09	5.68	2.68	0.18	0.03	2.89	2.79
2052	0.50	0.25	2.40	2.32	5.56	0.50	0.18	0.09	5.65	2.68	0.18	0.03	2.89	2.76
2053	0.50	0.13	1.60	2.40	3.83	0.10	0.18	0.02	3.85	1.34	0.09	0.01	1.44	2.41
3002	0.50	0.33	2.90	2.27	6.59	2.90	0.18	0.52	7.11	3.54	0.24	0.04	3.81	3.30
2005	0.55	0.25	1.00	2.27	2.27	0.60	0.18	0.11	2.38	2.68	0.18	0.03	2.89	-0.51
2023	1.00	0.25	1.40	2.11	2.96	0.50	0.18	0.09	3.05	2.68	0.18	0.03	2.89	0.16
2037	1.00	0.25	0.70	2.01	1.40	0.50	0.18	0.09	1.49	2.68	0.18	0.03	2.89	-1.39
2051	1.00	0.75	6.00	2.15	12.92	2.00	0.18	0.36	13.28	8.04	0.54	0.09	8.66	4.62
3001	1.00	0.25	0.00	0.00	0.00	1.00	0.18	0.18	0.18	2.68	0.18	0.03	2.89	-2.71
3010	1.00	0.25	0.50	2.23	1.12	0.10	0.18	0.02	1.13	2.68	0.18	0.03	2.89	-1.75
4001	1.00	0.25	1.20	2.08	2.49	0.60	0.18	0.11	2.60	2.68	0.18	0.03	2.89	-0.29
4002	1.00	1.00	12.40	2.32	28.71	1.30	0.18	0.23	28.94	10.71	0.71	0.12	11.55	17.40
4003	1.00	0.33	2.40	2.27	5.46	0.70	0.18	0.13	5.58	3.54	0.24	0.04	3.81	1.77
4004	1.00	1.00	13.00	2.36	30.67	2.60	0.18	0.46	31.13	10.71	0.71	0.12	11.55	19.58
4005	1.00	1.00	5.00	2.08	10.40	6.00	0.18	1.07	11.47	10.71	0.71	0.12	11.55	-0.08
Total	**18.80**	**11.11**	**94.00**		**214.15**	**32.40**		**5.79**	**219.94**	**118.98**	**7.93**	**1.32**	**128.24**	**91.70**

BW : Baby worms
Co : Cocoons

Average price of fresh cocoons /kg **2.10 USD**
Average productions of fresh cocoons /box **8.46 Kg**

	Average	
	Cocoons/box (Kg)	**Price of cocoons/kg (USD)**
Larger size of farm	7.99	1.96
Middle size of farm	8.85	2.11
Small size of farm	11.69	2.30

Appendix 40: 32nd Yield fresh cocoons

Banyumas Sutera Alam
Harvest season 32

1 USD : Rp 8,400.00
Total BW : **18.55 Box**
Price of BW/Box: USD 10.71

Month:	*Feb-02*		Sales							Cost				
ID	Land (Ha)	BW (Box)	fresh cocoons (good quality) Co (Kg)	Price/kg (USD)	Total I (USD)	poor quality Co (Kg)	Price/kg (USD)	Total II (USD)	Total Sales (I+II) (USD)	BW (USD)	Papzol (USD)	CaCo3 (USD)	Total Cost (USD)	Total Revenue (USD)
1027	0.25	0.50	4.90	2.23	10.94	0.60	0.18	0.11	11.04	5.36	0.36	0.06	5.77	5.27
1049	0.25	0.25	1.50	2.08	3.12	0.40	0.18	0.07	3.19	2.68	0.18	0.03	2.89	0.30
1009	0.30	1.00	24.80	2.19	54.33	1.00	0.18	0.18	54.51	10.71	0.71	0.12	11.55	42.96
1020	0.30	0.75	8.00	2.12	16.93	0.50	0.18	0.09	17.02	8.04	0.54	0.09	8.66	8.36
2034	0.30	0.50	5.20	2.04	10.61	0.50	0.18	0.09	10.70	5.36	0.36	0.06	5.77	4.93
2042	0.38	0.30	8.00	2.08	16.64	0.00	0.18	0.00	16.64	3.21	0.21	0.04	3.46	13.17
2039	0.50	0.75	1.20	2.19	2.63	0.00	0.18	0.00	2.63	8.04	0.54	0.09	8.66	-6.03
2030	0.50	0.75	3.80	2.01	7.62	0.60	0.18	0.11	7.73	8.04	0.54	0.09	8.66	-0.93
2045	0.50	0.75	0.50	1.97	0.98	0.10	0.18	0.02	1.00	8.04	0.54	0.09	8.66	-7.66
2060	0.50	0.50	0.60	1.97	1.18	0.00	0.18	0.00	1.18	5.36	0.36	0.06	5.77	-4.59
2047	0.50	0.25	1.70	1.97	3.35	0.00	0.18	0.00	3.35	2.68	0.18	0.03	2.89	0.46
2061	0.50	0.50	7.70	2.31	17.78	0.50	0.18	0.09	17.87	5.36	0.36	0.06	5.77	12.09
1022	1.00	0.25	4.00	2.27	9.09	0.10	0.18	0.02	9.11	2.68	0.18	0.03	2.89	6.22
1023	1.00	0.25	0.70	2.08	1.45	0.20	0.18	0.04	1.49	2.68	0.18	0.03	2.89	-1.40
1024	1.00	0.75	0.70	1.97	1.38	0.00	0.18	0.00	1.38	8.04	0.54	0.09	8.66	-7.28
1025	1.00	0.75	2.00	2.04	4.08	0.00	0.18	0.00	4.08	8.04	0.54	0.09	8.66	-4.58
1047	1.00	0.50	1.10	2.01	2.21	0.00	0.18	0.00	2.21	5.36	0.36	0.06	5.77	-3.57
2010	1.00	0.50	4.40	2.27	10.00	0.60	0.18	0.11	10.11	5.36	0.36	0.06	5.77	4.34
2011	1.00	0.63	7.10	2.12	15.03	1.20	0.18	0.21	15.24	6.70	0.45	0.07	7.22	8.02
2012	1.00	0.25	2.90	2.12	6.14	0.80	0.18	0.14	6.28	2.68	0.18	0.03	2.89	3.39
2013	1.00	0.50	10.10	2.19	22.13	0.00	0.18	0.00	22.13	5.36	0.36	0.06	5.77	16.35
2014	1.00	0.25	5.10	2.12	10.79	0.30	0.18	0.05	10.85	2.68	0.18	0.03	2.89	7.96
2018	1.00	1.00	6.80	2.19	14.92	0.50	0.18	0.09	15.01	10.71	0.71	0.12	11.55	3.47
2021	1.00	0.25	4.00	2.04	8.16	0.40	0.18	0.07	8.23	2.68	0.18	0.03	2.89	5.35
2023	1.00	1.00	5.90	1.97	11.61	2.60	0.18	0.46	12.08	10.71	0.71	0.12	11.55	0.53
2037	1.00	0.25	0.80	2.08	1.66	0.00	0.18	0.00	1.66	2.68	0.18	0.03	2.89	-1.22
2051	1.00	0.13	0.20	2.12	0.42	0.00	0.18	0.00	0.42	1.34	0.09	0.01	1.44	-1.02
3001	1.00	1.00	1.80	2.24	4.02	0.60	0.18	0.11	4.13	10.71	0.71	0.12	11.55	-7.42
3010	1.00	1.00	19.30	2.23	43.07	0.30	0.18	0.05	43.12	10.71	0.71	0.12	11.55	31.58
1018	1.25	0.25	0.40	2.04	0.82	0.30	0.18	0.05	0.87	2.68	0.18	0.03	2.89	-2.02
1050	1.50	0.75	1.00	1.97	1.97	0.00	0.18	0.00	1.97	8.04	0.54	0.09	8.66	-6.69
2057	1.50	0.50	0.40	1.93	0.77	0.00	0.18	0.00	0.77	5.36	0.36	0.06	5.77	-5.00
1021	2.00	0.50	0.50	2.04	1.02	0.70	0.18	0.13	1.15	5.36	0.36	0.06	5.77	-4.63
1026	3.00	0.50	0.80	1.97	1.57	0.10	0.18	0.02	1.59	5.36	0.36	0.06	5.77	-4.18
Total	**31.03**	**18.55**	**147.90**		**318.44**	**12.90**		**2.30**	**320.74**	**198.75**	**13.25**	**2.21**	**214.21**	**106.53**

BW : Baby worms
Co : Cocoons

Average price of fresh cocoons /kg **2.09 USD**
Average productions of fresh cocoons /box **7.97 Kg**

	Average	
	Cocoons/box (Kg)	Price of cocoons/kg (USD)
Larger size of farm	6.81	2.09
Middle size of farm	4.43	2.07
Small size of farm	15.88	2.12

Appendix 41: 33rd Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 33 **1 USD : Rp 8,400.00**

Total BW : **10.00 Box** **Price of BW/Box: USD 10.71**

Month:	***Mar-02***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total**				**Total**	**Total**
			Co	**Price/kg**	**Total I**	**Co**	**Price/kg**	**Total II**	**Sales (I+II)**	**BW**	**Papzol**	**CaCo3**	**Cost**	**Revenue**
	(Ha)	**(Box)**	**(Kg)**	**(USD)**	**(USD)**	**(Kg)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**
2058	0.20	0.50	9.40	2.04	19.18	1.80	0.18	0.32	19.50	5.36	0.36	0.06	5.77	13.73
1027	0.25	0.25	4.50	2.27	10.23	0.50	0.18	0.09	10.32	2.68	0.18	0.03	2.89	7.43
2038	0.35	0.25	0.50	1.92	0.96	0.20	0.18	0.04	0.99	2.68	0.18	0.03	2.89	-1.89
2049	0.45	0.25	1.20	2.04	2.45	0.50	0.18	0.09	2.54	2.68	0.18	0.03	2.89	-0.35
2030	0.50	0.25	0.50	1.93	0.97	0.70	0.18	0.13	1.09	2.68	0.18	0.03	2.89	-1.79
2035	0.50	0.25	1.50	1.93	2.90	0.60	0.18	0.11	3.00	2.68	0.18	0.03	2.89	0.12
2039	0.50	0.25	0.50	2.04	1.02	0.10	0.18	0.02	1.04	2.68	0.18	0.03	2.89	-1.85
2046	0.50	0.25	0.30	2.04	0.61	0.10	0.18	0.02	0.63	2.68	0.18	0.03	2.89	-2.26
2032	0.50	0.50	3.00	2.04	6.12	0.80	0.18	0.14	6.27	5.36	0.36	0.06	5.77	0.49
1001	1.00	0.50	2.30	2.00	4.60	0.70	0.18	0.13	4.73	5.36	0.36	0.06	5.77	-1.05
1002	1.00	0.50	2.50	2.44	6.10	0.50	0.18	0.09	6.19	5.36	0.36	0.06	5.77	0.42
1003	1.00	0.50	1.90	2.08	3.95	0.20	0.18	0.04	3.98	5.36	0.36	0.06	5.77	-1.79
1006	1.00	1.00	12.30	2.19	26.99	8.70	0.18	1.55	28.55	10.71	0.71	0.12	11.55	17.00
1007	1.00	0.75	8.20	2.15	17.67	2.00	0.18	0.36	18.03	8.04	0.54	0.09	8.66	9.37
1010	1.00	1.00	7.60	2.32	17.60	1.50	0.18	0.27	17.87	10.71	0.71	0.12	11.55	6.32
1011	1.00	1.00	12.20	2.27	27.73		0.18	0.00	27.73	10.71	0.71	0.12	11.55	16.19
1015	1.00	1.00	7.50	2.19	16.46		0.18	0.00	16.46	10.71	0.71	0.12	11.55	4.91
1017	4.00	1.00	5.90	2.09	12.35	4.00	0.18	0.71	13.06	10.71	0.71	0.12	11.55	1.52
Total	**15.75**	**10.00**	**81.80**		**177.90**	**22.90**		**4.09**	**181.98**	**107.14**	**7.14**	**1.19**	**115.48**	**66.51**

BW : Baby worms ***Average price of fresh cocoons /kg*** **2.11 USD**

Co : Cocoons ***Average productions of fresh cocoons /box*** **8.18 Kg**

	Average	
	Cocoons/box (Kg)	**Price of cocoons/kg (USD)**
Larger size of farm	8.33	2.19
Middle size of farm	3.87	2.00
Small size of farm	12.48	2.07

Appendix 42: 34th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 34 **1 USD : Rp 8,400.00**

Total BW : **6.25 Box** **Price of BW/Box: USD 10.71**

Month:	***Apr-02***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total**				**Total**	**Total**
			Co	**Price/kg**	**Total I**	**Co**	**Price/kg**	**Total II**	**Sales (I+II)**	**BW**	**Papzol**	**CaCo3**	**Cost**	**Revenue**
	(Ha)	**(Box)**	**(Kg)**	**(USD)**	**(USD)**	**(Kg)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**
2005	0.55	0.25	4.00	2.20	8.80	0.90	0.18	0.16	8.96	2.68	0.18	0.03	2.89	6.07
2006	0.50	0.50	7.80	2.27	17.73	-	0.18	-	17.73	5.36	0.36	0.06	5.77	11.96
2017	0.50	0.50	6.00	2.27	13.64	1.00	0.18	0.18	13.82	5.36	0.36	0.06	5.77	8.04
2019	0.50	0.25	7.30	2.35	17.17	-	0.18	-	17.17	2.68	0.18	0.03	2.89	14.28
2020	0.50	0.25	3.90	2.19	8.54	-	0.18	-	8.54	2.68	0.18	0.03	2.89	5.66
2024	0.50	0.50	7.70	2.23	17.18	-	0.18	-	17.18	5.36	0.36	0.06	5.77	11.41
2025	0.50	0.50	6.00	2.35	14.11	0.50	0.18	0.09	14.20	5.36	0.36	0.06	5.77	8.42
2026	0.50	1.00	10.70	2.23	23.88	0.80	0.18	0.14	24.02	10.71	0.71	0.12	11.55	12.47
1050	1.50	0.50	6.70	2.19	14.70	-	0.18	-	14.70	5.36	0.36	0.06	5.77	8.93
5001	3.50	1.00	6.00	2.19	13.17	0.10	0.18	0.02	13.19	10.71	0.71	0.12	11.55	1.64
1026	3.00	1.00	13.50	2.27	30.69	0.80	0.18	0.14	30.83	10.71	0.71	0.12	11.55	19.28
Total	**12.05**	**6.25**	**79.60**		**179.61**	**4.10**		**0.73**	**180.34**	**66.96**	**4.46**	**0.74**	**72.17**	**108.17**

BW : Baby worms ***Average price of fresh cocoons /kg*** **2.25 USD**

Co : Cocoons ***Average productions of fresh cocoons /box*** **12.74 Kg**

	Average	
	Cocoons/box	**Price of cocoons/kg**
	(Kg)	**(USD)**
Larger size of farm	10.48	2.22
Middle size of farm	14.24	2.26
Small size of farm	0.00	-

Appendix 43: 35th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 35 **1 USD : Rp 8,400.00**

Total BW : **14.00 Box** **Price of BW/Box: USD 10.71**

Month:	***May-02***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total**				**Total**	**Total**
			Co	**Price/kg**	**Total I**	**Co**	**Price/kg**	**Total II**	**Sales (I+II)**	**BW**	**Papzol**	**CaCo3**	**Cost**	**Revenue**
	(Ha)	**(Box)**	**(Kg)**	**(USD)**	**(USD)**	**(Kg)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**
2002	0.30	0.50	6.70	2.19	14.68	0.50	0.18	0.09	14.77	5.36	0.36	0.06	5.77	8.99
2003	0.30	0.25	6.70	2.32	15.51	0.20	0.18	0.04	15.55	2.68	0.18	0.03	2.89	12.66
2004	0.30	0.25	2.00	2.04	4.08	0.50	0.18	0.09	4.17	2.68	0.18	0.03	2.89	1.28
2001	0.40	1.00	18.10	2.28	41.22	2.70	0.18	0.48	41.70	10.71	0.71	0.12	11.55	30.15
2043	0.50	1.00	2.00	2.27	4.55	1.00	0.18	0.18	4.73	10.71	0.71	0.12	11.55	-6.82
2024	0.50	1.00	18.30	2.28	41.67	3.50	0.18	0.63	42.30	10.71	0.71	0.12	11.55	30.75
2025	0.50	0.50	7.76	2.44	18.94	0.74	0.18	0.13	19.07	5.36	0.36	0.06	5.77	13.30
2026	0.50	0.25	1.20	2.19	2.63	0.00	0.18	0.00	2.63	2.68	0.18	0.03	2.89	-0.25
2027	0.50	0.25	4.10	2.67	10.94	1.00	0.18	0.18	11.12	2.68	0.18	0.03	2.89	8.23
1022	1.00	0.50	13.40	2.36	31.61	0.00	0.18	0.00	31.61	5.36	0.36	0.06	5.77	25.84
1023	1.00	0.25	5.10	2.36	12.03	0.20	0.18	0.04	12.07	2.68	0.18	0.03	2.89	9.18
1024	1.00	1.00	12.50	2.35	29.39	2.00	0.18	0.36	29.75	10.71	0.71	0.12	11.55	18.20
1025	1.00	1.00	12.90	2.35	30.33	0.00	0.18	0.00	30.33	10.71	0.71	0.12	11.55	18.79
1047	1.00	0.50	14.80	2.32	34.34	0.00	0.18	0.00	34.34	5.36	0.36	0.06	5.77	28.56
2010	1.00	0.50	7.50	2.49	18.65	0.00	0.18	0.00	18.65	5.36	0.36	0.06	5.77	12.88
2011	1.00	0.50	6.60	2.35	15.52	0.00	0.18	0.00	15.52	5.36	0.36	0.06	5.77	9.75
2012	1.00	3.00	53.70	2.36	126.68	5.80	0.18	1.04	127.72	32.14	2.14	0.36	34.64	93.07
1018	1.25	0.25	4.80	2.19	10.53	0.00	0.18	0.00	10.53	2.68	0.18	0.03	2.89	7.65
1050	1.50	0.50	6.60	2.49	16.41	0.50	0.18	0.09	16.50	5.36	0.36	0.06	5.77	10.73
1021	2.00	0.50	8.20	2.62	21.52	0.27	0.18	0.05	21.56	5.36	0.36	0.06	5.77	15.79
1026	3.00	0.50	22.30	2.49	55.46	0.00	0.18	0.00	55.46	5.36	0.36	0.06	5.77	49.68
Total	**19.55**	**14.00**	**235.26**		**556.71**	**18.91**		**3.38**	**560.08**	**150.00**	**10.00**	**1.67**	**161.67**	**398.42**

BW : Baby worms ***Average price of fresh cocoons /kg*** **2.35 USD**

Co : Cocoons ***Average productions of fresh cocoons /box*** **16.80 Kg**

	Average	
	Cocoons/box (Kg)	**Price of cocoons/kg (USD)**
Larger size of farm	18.71	2.39
Middle size of farm	11.12	2.37
Small size of farm	16.75	2.21

Appendix 44: 36th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 36 **1 USD : Rp 8,400.00**

Total BW : **9.50 Box** **Price of BW/Box: USD 10.71**

Month:	***Jun-02***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total**				**Total Cost**	**Total Revenue**
	(Ha)	**(Box)**	**Co (Kg)**	**Price/kg (USD)**	**Total I (USD)**	**Co (Kg)**	**Price/kg (USD)**	**Total II (USD)**	**Sales (I+II) (USD)**	**BW (USD)**	**Papzol (USD)**	**CaCo3 (USD)**	**(USD)**	**(USD)**
1020	0.30	0.25	0.80	2.27	1.82	0.10	0.18	0.02	1.84	2.68	0.18	0.03	2.89	-1.07
2038	0.35	0.75	2.20	2.08	4.57	0.40	0.18	0.07	4.64	8.04	0.54	0.09	8.66	-4.09
2042	0.38	0.75	5.00	2.44	12.20	1.00	0.18	0.18	12.38	8.04	0.54	0.09	8.66	3.54
2040	0.50	0.25	5.20	2.24	11.62	0.50	0.18	0.09	11.71	2.68	0.18	0.03	2.89	8.74
2041	0.50	0.25	1.60	2.36	3.77	0.40	0.18	0.07	3.85	2.68	0.18	0.03	2.89	0.89
2043	0.50	0.50	8.90	2.49	22.13	1.00	0.18	0.18	22.31	5.36	0.36	0.06	5.77	16.36
2044	0.50	0.50	7.80	2.57	20.05	1.20	0.18	0.21	20.26	5.36	0.36	0.06	5.77	14.27
2045	0.50	0.50	8.50	2.44	20.75	0.80	0.18	0.14	20.89	5.36	0.36	0.06	5.77	14.97
2046	0.50	0.50	5.50	2.19	12.07	0.60	0.18	0.11	12.18	5.36	0.36	0.06	5.77	6.30
2047	0.50	0.50	4.50	2.12	9.52	0.50	0.18	0.09	9.61	5.36	0.36	0.06	5.77	3.75
2048	0.50	0.50	7.70	2.57	19.79	0.20	0.18	0.04	19.83	5.36	0.36	0.06	5.77	14.02
2050	0.50	0.50	9.20	2.40	22.11	0.30	0.18	0.05	22.17	5.36	0.36	0.06	5.77	16.34
2052	0.50	0.25	0.50	2.12	1.06	0.00	0.18	0.00	1.06	2.68	0.18	0.03	2.89	-1.83
3010	1.00	0.50	8.80	2.36	20.76	1.20	0.18	0.21	20.97	5.36	0.36	0.06	5.77	14.99
1050	1.50	1.00	3.20	2.08	6.65	0.70	0.18	0.13	6.78	10.71	0.71	0.12	11.55	-4.90
1026	3.00	2.00	15.50	2.27	35.23	2.00	0.18	0.36	35.59	21.43	1.43	0.24	23.10	12.14
Total	**11.53**	**9.50**	**94.90**		**224.13**	**10.90**		**1.95**	**226.07**	**101.79**	**6.79**	**1.13**	**109.70**	**114.42**

BW : Baby worms ***Average price of fresh cocoons /kg*** **2.31 USD**

Co : Cocoons ***Average productions of fresh cocoons /box*** **9.99 Kg**

	Average	
	Cocoons/box (Kg)	Price of cocoons/kg (USD)
Larger size of farm	7.86	2.24
Middle size of farm	13.98	2.35
Small size of farm	4.57	2.26

Appendix 45: 37th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 37 **1 USD : Rp 8,400.00**

Total BW : **16.50 Box** **Price of BW/Box: USD 10.71**

Month:	***Jul-02***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total**				**Total**	**Total**
			Co	**Price/kg**	**Total I**	**Co**	**Price/kg**	**Total II**	**Sales (I+II)**	**BW**	**Papzol**	**CaCo3**	**Cost**	**Revenue**
	(Ha)	**(Box)**	**(Kg)**	**(USD)**	**(USD)**	**(Kg)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**
2016	0.15	1.00	16.00	2.36	37.74	2.00	0.18	0.36	38.10	10.71	0.71	0.12	11.55	26.55
2015	0.20	0.25	4.50	2.19	9.88	0.30	0.18	0.05	9.93	2.68	0.18	0.03	2.89	7.04
1049	0.25	0.25	5.40	2.40	12.98	0.00	0.18	0.00	12.98	2.68	0.18	0.03	2.89	10.09
2008	0.30	1.50	16.00	2.52	40.36	0.50	0.18	0.09	40.45	16.07	1.07	0.18	17.32	23.13
2009	0.30	0.25	4.80	2.32	11.11	0.20	0.18	0.04	11.15	2.68	0.18	0.03	2.89	8.26
2007	0.35	1.00	28.00	2.40	67.30	2.00	0.18	0.36	67.65	10.71	0.71	0.12	11.55	56.11
2042	0.38	0.25	2.00	2.36	4.72	0.50	0.18	0.09	4.81	2.68	0.18	0.03	2.89	1.92
2060	0.50	0.50	9.30	2.40	22.35	2.00	0.18	0.36	22.71	5.36	0.36	0.06	5.77	16.94
2061	0.50	0.25	8.30	2.40	19.95	0.00	0.18	0.00	19.95	2.68	0.18	0.03	2.89	17.06
2062	0.50	0.25	5.00	2.36	11.80	0.50	0.18	0.09	11.88	2.68	0.18	0.03	2.89	9.00
2063	0.50	0.75	11.00	2.36	25.95	0.70	0.18	0.13	26.07	8.04	0.54	0.09	8.66	17.41
3002	0.50	0.75	18.00	2.49	44.76	0.00	0.18	0.00	44.76	8.04	0.54	0.09	8.66	36.10
3005	0.50	1.00	10.50	2.40	25.15	0.40	0.18	0.07	25.22	10.71	0.71	0.12	11.55	13.68
3006	0.50	0.50	5.00	2.36	11.80	2.00	0.18	0.36	12.15	5.36	0.36	0.06	5.77	6.38
1047	1.00	0.75	3.00	1.97	5.90	0.50	0.18	0.09	5.99	8.04	0.54	0.09	8.66	-2.67
2010	1.00	0.75	15.00	2.32	34.73	3.00	0.18	0.54	35.27	8.04	0.54	0.09	8.66	26.61
2011	1.00	0.50	0.00	0.00	0.00	0.00	0.18	0.00	0.00	5.36	0.36	0.06	5.77	-5.77
2012	1.00	0.75	10.50	2.40	25.15	3.00	0.18	0.54	25.69	8.04	0.54	0.09	8.66	17.03
2013	1.00	0.50	13.00	2.44	31.73	2.50	0.18	0.45	32.18	5.36	0.36	0.06	5.77	26.41
2014	1.00	0.50	1.00	2.04	2.04	0.00	0.18	0.00	2.04	5.36	0.36	0.06	5.77	-3.73
2018	1.00	0.50	8.50	1.97	16.73	4.00	0.18	0.71	17.44	5.36	0.36	0.06	5.77	11.67
2021	1.00	1.00	10.00	2.32	23.15	1.00	0.18	0.18	23.33	10.71	0.71	0.12	11.55	11.79
1050	1.50	0.75	6.00	2.15	12.93	3.00	0.18	0.54	13.46	8.04	0.54	0.09	8.66	4.80
1026	3.00	2.00	35.00	2.49	87.04	4.00	0.18	0.71	87.76	21.43	1.43	0.24	23.10	64.66
Total	**17.93**	**16.50**	**245.80**		**585.26**	**32.10**		**5.73**	**590.99**	**176.79**	**11.79**	**1.96**	**190.54**	**400.46**

BW : Baby worms ***Average price of fresh cocoons /kg*** **2.23 USD**

Co : Cocoons ***Average productions of fresh cocoons /box*** **14.90 Kg**

	Average	
	Cocoons/box (Kg)	**Price of cocoons/kg (USD)**
Larger size of farm	12.75	2.01
Middle size of farm	16.78	2.40
Small size of farm	17.04	2.37

Appendix 46: 38th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 38 **1 USD : Rp8,400.00**

Total BW : **6.00 Box** **Price of BW/Box: USD 10.71**

Month:	***Aug-02***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total**				**Total Cost**	**Total Revenue**
	(Ha)	**(Box)**	**Co (Kg)**	**Price/kg (USD)**	**Total I (USD)**	**Co (Kg)**	**Price/kg (USD)**	**Total II (USD)**	**Sales (I+II) (USD)**	**BW (USD)**	**Papzol (USD)**	**CaCo3 (USD)**	**(USD)**	**(USD)**
2002	0.30	1.00	7.50	2.08	15.59	3.00	0.18	0.54	16.12	10.71	0.71	0.12	11.55	4.58
2003	0.30	0.25	2.50	1.52	3.81	2.00	0.18	0.36	4.16	2.68	0.18	0.03	2.89	1.28
2004	0.30	0.25	2.75	1.65	4.55	1.00	0.18	0.18	4.73	2.68	0.18	0.03	2.89	1.84
2001	0.40	0.25	4.50	1.94	8.73	1.00	0.18	0.18	8.91	2.68	0.18	0.03	2.89	6.02
2031	0.50	0.25	5.50	2.12	11.64	1.00	0.18	0.18	11.81	2.68	0.18	0.03	2.89	8.93
2024	0.50	0.50	2.50	1.97	4.92	0.00	0.18	0.00	4.92	5.36	0.36	0.06	5.77	-0.85
2025	0.50	0.50	3.50	1.71	5.98	0.50	0.18	0.09	6.07	5.36	0.36	0.06	5.77	0.29
2054	0.50	0.50	3.50	1.78	6.23	1.50	0.18	0.27	6.50	5.36	0.36	0.06	5.77	0.72
2047	0.50	1.00	5.60	1.76	9.88	2.40	0.18	0.43	10.30	10.71	0.71	0.12	11.55	-1.24
2037	1.00	0.50	6.00	1.93	11.59	1.50	0.18	0.27	11.85	5.36	0.36	0.06	5.77	6.08
1018	1.25	0.50	8.50	2.19	18.62	1.00	0.18	0.18	18.80	5.36	0.36	0.06	5.77	13.03
5001	3.50	0.50	5.00	2.08	10.39	3.00	0.18	0.54	10.93	5.36	0.36	0.06	5.77	5.15
Total	**9.55**	**6.00**	**57.35**		**111.91**	**17.90**		**3.20**	**115.10**	**64.29**	**4.29**	**0.71**	**69.29**	**45.82**

BW : Baby worms ***Average price of fresh cocoons /kg*** **1.89 USD**

Co : Cocoons ***Average productions of fresh cocoons /box*** **9.56 Kg**

	Average	
	Cocoons/b (Kg)	**Price of cocoons/kg (USD)**
Larger size of farm	13.00	2.07
Middle size of farm	7.49	1.87
Small size of farm	9.86	1.80

Appendix 47: 39th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season39 **1 USD : Rp 8,400.00**

Total BW : **3.75 Box** **Price of BW/Box: USD 10.71**

Month:	***Oct-02***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total**				**Total**	**Total**
			Co	**Price/kg**	**Total I**	**Co**	**Price/kg**	**Total II**	**Sales (I+II)**	**BW**	**Papzol**	**CaCo3**	**Cost**	**Revenue**
	(Ha)	**(Box)**	**(Kg)**	**(USD)**	**(USD)**	**(Kg)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**	**(USD)**
1014	0.50	0.50	8.50	2.28	19.36	1.00	0.18	0.18	19.54	5.36	0.36	0.06	5.77	13.76
1028	0.50	0.75	10.00	2.28	22.77	0.50	0.18	0.09	22.86	8.04	0.54	0.09	8.66	14.20
2005	0.50	0.38	1.00	2.20	2.20	0.00	0.18	0.00	2.20	4.02	0.27	0.04	4.33	-2.13
2028	0.50	0.25	3.70	2.28	8.43	0.25	0.18	0.04	8.47	2.68	0.18	0.03	2.89	5.58
2041	0.50	0.13	0.70	2.20	1.54	0.00	0.18	0.00	1.54	1.34	0.09	0.01	1.44	0.09
2050	0.50	0.50	7.50	2.40	18.03	0.20	0.18	0.04	18.06	5.36	0.36	0.06	5.77	12.29
2055	0.50	0.25	3.00	2.32	6.96	0.10	0.18	0.02	6.98	2.68	0.18	0.03	2.89	4.09
1025	1.00	1.00	3.30	2.00	6.61	1.30	0.18	0.23	6.84	10.71	0.71	0.12	11.55	-4.71
Total	**4.50**	**3.75**	**37.70**		**85.88**	**3.35**		**0.60**	**86.48**	**40.18**	**2.68**	**0.45**	**43.30**	**43.17**

BW : Baby worms ***Average price of fresh cocoons /kg*** **2.24 USD**

Co : Cocoons ***Average productions of fresh cocoons /box*** **10.05 Kg**

	Average	
	Cocoons/box	**Price of cocoons/kg**
	(Kg)	**(USD)**
Larger size of farm	3.30	2.00
Middle size of farm	12.51	2.28
Small size of farm	0.00	-

Appendix 48: 40th Yield fresh cocoons

Banyumas Sutera Alam

Harvest season 40 **1 USD : Rp8,400.00**

Total BW : **8.00 Box** **Price of BW/Box: USD 10.71**

Month:	***Nov-02***		**Sales**							**Cost**				
ID	**Land**	**BW**	**fresh cocoons (good quality)**			**poor quality**			**Total**				**Total Cost**	**Total Revenue**
	(Ha)	**(Box)**	**Co (Kg)**	**Price/kg (USD)**	**Total I (USD)**	**Co (Kg)**	**Price/kg (USD)**	**Total II (USD)**	**Sales (I+II) (USD)**	**BW (USD)**	**Papzol (USD)**	**CaCo3 (USD)**	**(USD)**	**(USD)**
2005	0.25	0.25	4.60	2.32	10.67	0.00	0.18	0.00	10.67	2.68	0.18	0.03	2.89	7.79
2017	0.50	1.50	15.80	2.28	35.98	5.00	0.18	0.89	36.87	16.07	1.07	0.18	17.32	19.55
2025	0.50	0.50	7.50	2.32	17.40	0.50	0.18	0.09	17.49	5.36	0.36	0.06	5.77	11.72
2043	0.50	0.50	8.00	2.00	16.01	2.50	0.18	0.45	16.46	5.36	0.36	0.06	5.77	10.69
2062	0.50	0.50	8.50	2.40	20.43	1.00	0.18	0.18	20.61	5.36	0.36	0.06	5.77	14.83
2051	1.00	0.50	2.00	1.71	3.43	3.00	0.18	0.54	3.96	5.36	0.36	0.06	5.77	-1.81
1010	1.00	1.50	25.50	2.40	61.29	1.50	0.18	0.27	61.56	16.07	1.07	0.18	17.32	44.23
1011	1.00	0.50	8.00	2.19	17.53	1.00	0.18	0.18	17.71	5.36	0.36	0.06	5.77	11.93
2023	1.00	1.25	20.20	2.24	45.15	1.00	0.18	0.18	45.33	13.39	0.89	0.15	14.43	30.90
1026	3.00	1.00	12.00	2.40	28.84	1.50	0.18	0.27	29.11	10.71	0.71	0.12	11.55	17.56
Total	**9.25**	**8.00**	**112.10**		**256.73**	**17.00**		**3.04**	**259.77**	**85.71**	**5.71**	**0.95**	**92.38**	**167.38**

BW : Baby worms ***Average price of fresh cocoons /kg*** **2.23 USD**

Co : Cocoons ***Average productions of fresh cocoons /box*** **14.01 Kg**

	Average	
	Cocoons/box (Kg)	**Price of cocoons/kg (USD)**
Larger size of farm	14.25	2.19
Middle size of farm	13.27	2.25
Small size of farm	18.40	2.32

Appendix 49: Investment Analysis for The Project until 2008

Investment Anaysis for Project BSA
in USD

Results	IRR	IRR-ref.int	NPW	BCR
Larger Land				
B.F.	6.70%	-6.30%	-771.39	1.25
Middle Land				
B.F.	44.58%	31.58%	2,640.61	1.55
Small Land				
B.F.	7.88%	-5.12%	-303.07	1.38

ref.int.	13%
lend interest long term	18%
lend interest short term	18%

B.F. = Before Financing
IRR = Internal Rate of Return
ref.int. = Reference Interest
NPW = Net Present Worth
BCR = Benefit Cost Ratio

Year:	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Inflow										
Larger Land										
Revenues	660	712	379	89	1,846	1,846	1,846	1,846	1,846	1,846
Residual Value										0
Middle Land										
Revenues	120	849	438	128	1,175	1,175	1,175	1,175	1,175	1,175
Residual Value										0
Small Land										
Revenues	0	343	346	102	588	588	588	588	588	588
Residual Value										0
Outflow										
Larger Land										
Investments	1,107									
Incr. Working Capital										
Operating Costs	250	566	553	596	1,255	1,255	1,255	1,255	1,255	1,255
Middle Land										
Investments	712									
Incr. Working Capital										
Operating Costs	68	255	290	282	729	729	729	729	729	729
Small Land										
Investments	564									
Incr. Working Capital										
Operating Costs	0	132	211	190	385	385	385	385	385	385
Net Benefits B.F.										
Larger Land	-697	-551	-725	-1,232	-641	-51	539	1,130	1,720	2,311
Middle Land	-660	-66	82	-72	374	820	1,266	1,712	2,158	2,604
Small Land	-564	-353	-218	-305	-103	99	301	503	705	908